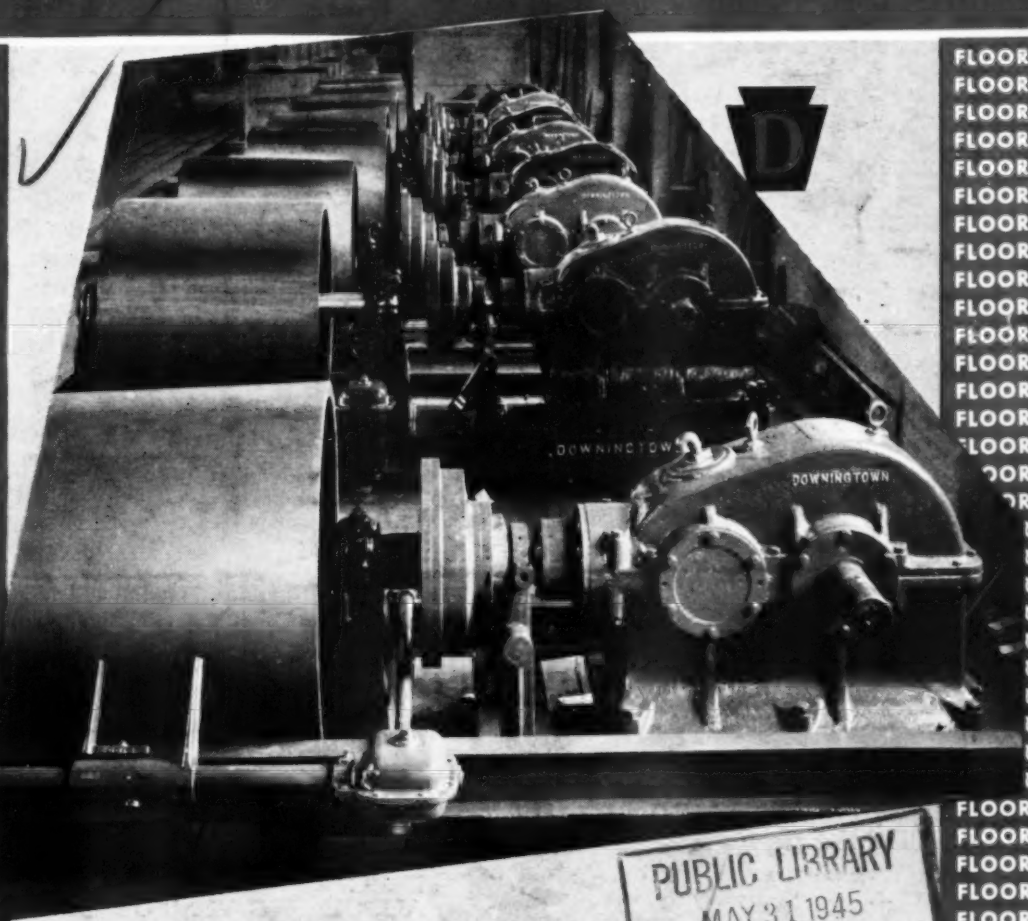
THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE — MAY, 1945



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MAY 31 1945
DETROIT

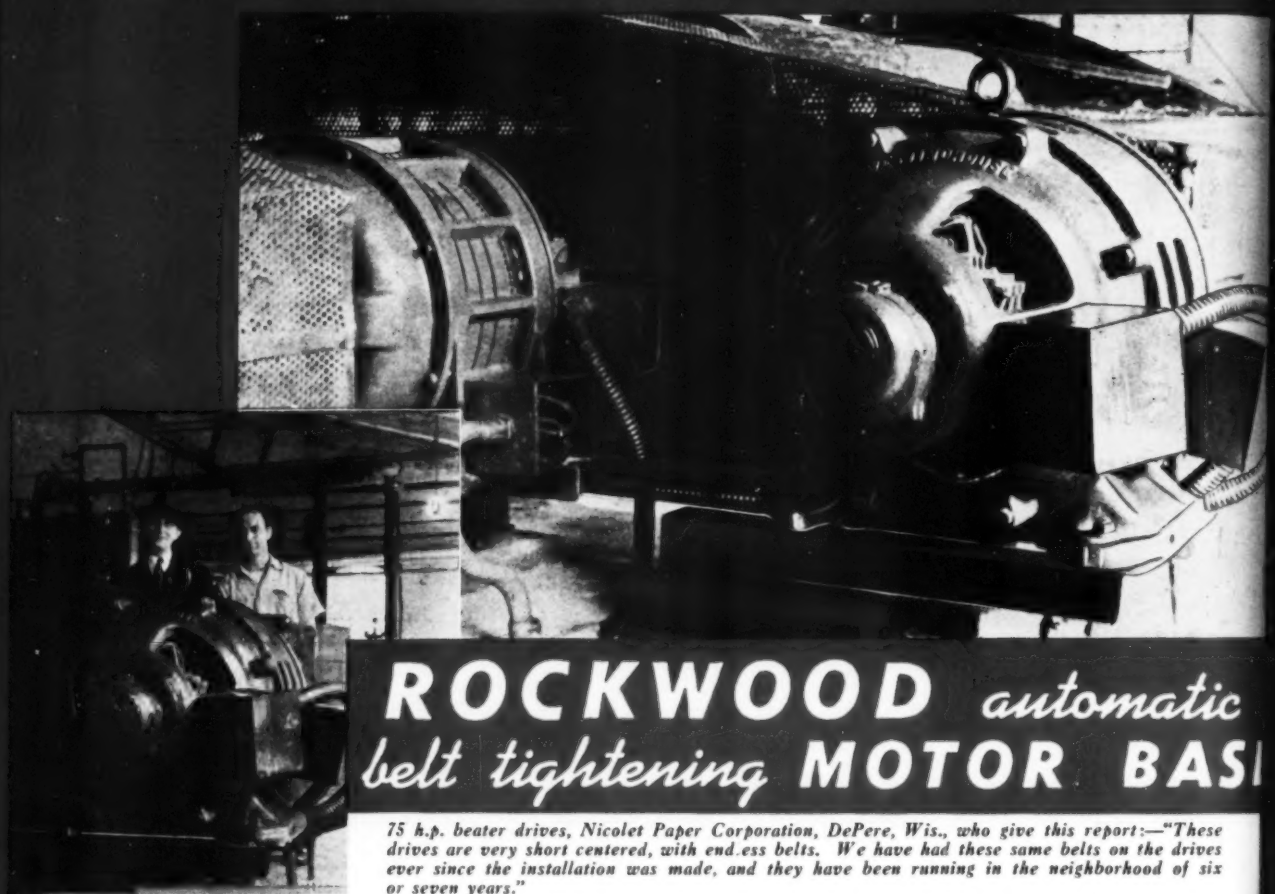
Strain of wartime operation has been hard on many floor drives. If they are badly worn, they can waste a lot of power. Whether you need new ones for this reason, or because your post-war machine modernization calls for higher speeds, remember we make all types and that they are especially designed for paper machines.

DOWNINGTOWN MFG. CO., DOWNINGTOWN, PA.

DOWNINGTOWN ... FLOOR DRIVES

BECAUSE BELT TENSION *must be* CONTROLLED

as every paper mill engineer knows



ROCKWOOD *automatic belt tightening* MOTOR BASI

75 h.p. beater drives, Nicolet Paper Corporation, DePere, Wis., who give this report:—"These drives are very short centered, with end.ess belts. We have had these same belts on the drives ever since the installation was made, and they have been running in the neighborhood of six or seven years."

IMPROVES MACHINE PERFORMANCE AND SAVES MONEY

Paper mill engineers know a lot about belt drives. They have to as paper mills use so much power.

Paper and pulp mills all over the country are installing Rockwood automatic belt tightening motor bases to control tension of both V-belts and flat belt drives.

They find that such installations increase the capacity of their beaters, pumps, chippers, barkers, belt driven Jordans, etc.; they result in more satisfactory machine performance, save power and operate for longer periods without maintenance. They also insure about double the life of their belts, V or flat.

One undeniable fact stands out — EVERY SHORT CENTER BELT DRIVE FROM ELECTRIC MOTORS SHOULD HAVE AUTOMATIC TENSION CONTROL. *Because such* belt drives are more dependable, are tops for continuous operation, tops, too, in saving power, in requiring less maintenance and for savings in costs.

Rockwood originated, engineered and pioneered automatic belt tension control. Rockwood pivoted motor bases are immediately available from stock up to 60 h.p.—from semi stock to 250 h.p. and larger sizes made promptly to order.

ROCKWOOD

INDIANAPOLIS • U.S.A.

Specialists in Power Transmission Equipment Since 1884

PAPER IS PART OF THE FOOD PICTURE
Essential is the word for this equipment, running continuously on waxed paper grades for food at the Kalamazoo Vegetable Parchment Co., Kalamazoo, Michigan. For the purchase of this 134" Waxing Machine—the last Beloit machine to be installed at Kalamazoo before the war—the mill had high priority. It's only a fraction of Kalamazoo's entire equipment, of course . . . but typical of its quality and importance.
Beloit Iron Works, Beloit, Wisconsin
Buy War Bonds for Victory
BELOIT IRON WORKS
PAPER MACHINERY
BELOIT, WIS., U.S.A.
A PAPER MILL IS PART OF EVERY BATTLE
BELOIT
PAPER MACHINERY
WHEN YOU BUY BELOIT . . . YOU BUY MORE THAN A MACHINE!

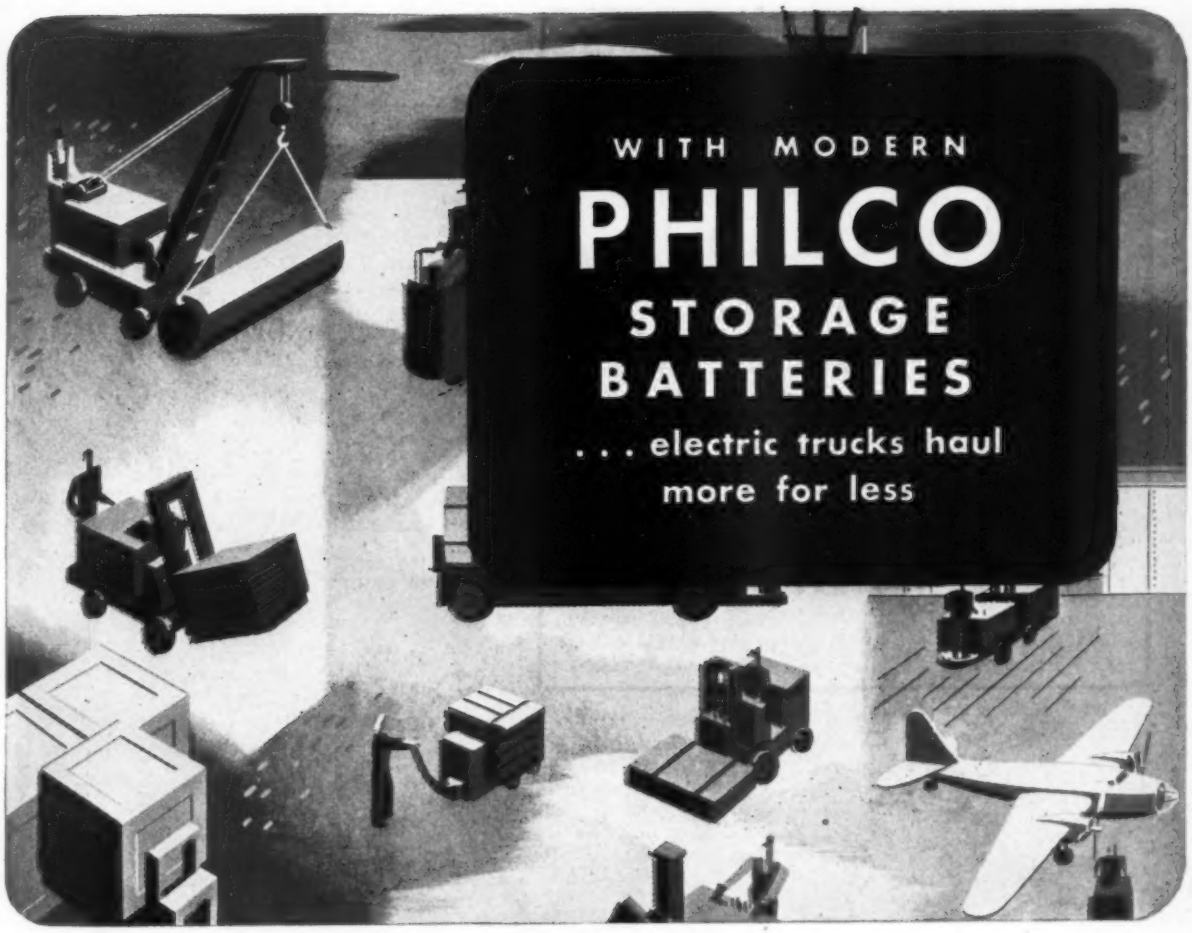
For Over 50 Years

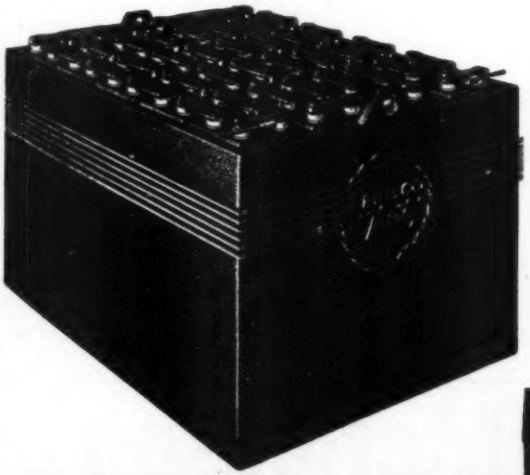
APPLETON FELTS

make good paper

Appleton Woolen Mills

APPLETON · WISCONSIN

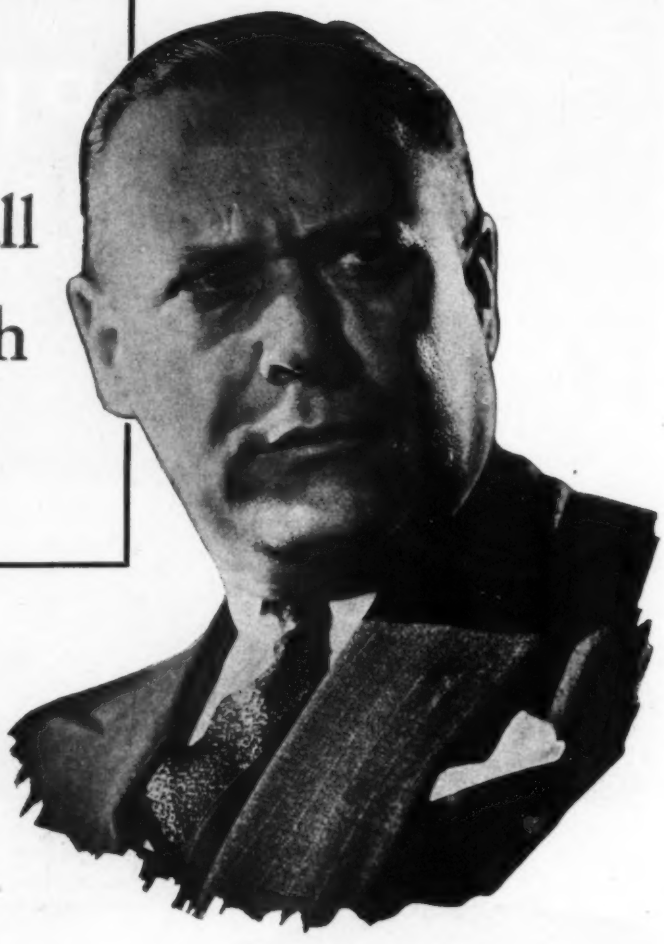




MORE THAN ever, today, Philco stands out as the leader in the development of modern high capacity, long-life storage batteries for electric industrial trucks. Well known to material handling men is the pioneering work of Philco with its famous XL and XVL type Batteries. And now, in addition, the great new Philco "Thirty" with 30% longer life, is available in increasing quantities for current deliveries. Powered by modern Philco Batteries, your electric trucks do more work. Philco dependability and longer life save you money. Write today for new descriptive catalogs. PHILCO CORPORATION, *Storage Battery Division,* Trenton 7, New Jersey.

For 50 years a Leader in Industrial Storage Battery Development

"what! you mean I can't buy all the Soda Ash I want?"



YES, MR. INDUSTRIALIST, that's the situation on Soda Ash . . . as long as present heavy war demand continues.

Too often this basic "work-horse" of industry is taken for granted. Yet Soda Ash is absolutely indispensable in a wide variety of industrial processes.

What has happened to all the Soda Ash? It has gone into vastly expanded production of glass containers to save scarce metals. Into the manufacture of aluminum and other metals vital to war production. Into the making of explosives. Into the manufacture of chemicals, pulp and paper, textiles, soap and soap powders, water softeners, cleansers and literally hundreds of miscellaneous materials.

Despite war's complications, alkali manufacturers have set an enviable record in supplying the steadily expanding Soda Ash requirements of industry. And Mathieson, playing no favorites, has followed a policy in its commitments of "cutting the cloth to fit the pattern", is continuing to take care of its contract customers, large and small, with little or no occasion for late deliveries or other disappointments . . . regrets only that its production facilities have not been great enough at all times to serve all potential Mathieson customers.

Yes, Mr. Industrialist, if they ever start pinning medals on industrial products for valiant war service, Soda Ash will sport a chest full! Think of that if you haven't been able to buy all the Soda Ash you want!

Mathieson
CHEMICALS

THE MATHIESON ALKALI WORKS (INC.)
60 East 42nd Street, New York 17, N. Y.

Soda Ash ... Caustic Soda ... Liquid Chlorine ... Bicarbonate of Soda ... Chlorine Dioxide ... Ammonia, Anhydrous & Aqua ... HTH Products ... Fused Alkali Products ... Synthetic Salt Cake ... Dry Ice ... Carbonic Gas ... Sodium Chlorite Products ... Sodium Methylate

THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

— Serving the Industry Since 1919 —

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Perhaps Rodin had a papermaker in mind when he chiseled his famous "Thinker". Any Thinker, pondering paper making problems in 1945, should be reasoning along this line:

WHAT?—More modern equipment all through the mill.

WHY?—To produce better quality faster and at the same or reduced cost.

WHEN?—As soon as materials are available.

HOW?—By calling in seasoned equipment engineers and starting to lay plans.

WHERE?—From firms long in the field and full of the necessary "know how."

WHO?—Black-Clawson, Shartle, Dilts, largest supplier group in the world.

You're a papermaker. Suppose you ask yourself these same questions. You'll get the same answers.

BLACK-CLAWSON CO., HAMILTON, OHIO

DIVISIONS:

SHARTLE BROS., MIDDLETOWN, OHIO DILTS MACHINE WORKS, FULTON, N. Y.

The Thinker

Above: View of a 100,000-gal. Horton elevated water tank which we built and erected for a paper mill in Florida. It provides gravity water pressure for sprinkler service.

Right: 300-ton lime bin, 3 ft. to bottom. It is 20 ft. in diam. by 33 ft. 3 in. high.

. . . TODAY is not too soon

Present production schedules throughout the paper industry are due for a change. *Farsighted* pulp mills are already planning modernization programs.

If you are contemplating the installation of storage tanks, call our nearest office. We design and fabricate all kinds of steel plate work including flat-bottom storage tanks, cylindrical tanks, diffusers, sulphate and sulphite digesters, steel smoke stacks and bins. If your specifications call for x-raying or stress-relieving in accordance with paragraph U-68 of the A.S.M.E. Code for Unfired Pressure Vessels, we have facilities for doing this type of work.

Write our nearest office today for quotations and delivery dates.

The photos on this page show a few of the various types of tanks we designed and built for the paper industry.

Large Photo Above: View showing five of six 14-ft. 6-in. diam. by 33-ft. 4-in. diffusers which we built for a mill in Florida.

Upper Left Photo: Four digesters which we designed and built for a Louisiana paper company. They are 10 ft. 8 in. in diam. by 31 ft. 8 in. and were x-rayed and stress-relieved.

CHICAGO BRIDGE & IRON COMPANY

Chicago, 4.....2445 McCormick Building
New York, 6.....3350-165 Broadway Building
Cleveland, 15.....2267 Guildhall Building
Los Angeles, 14.....1459 Wm. Fox Building
Birmingham, 1.....1511 North 50th Street

Tulsa, 3.....1651 Hunt Building
Houston, 1.....3643 Clinton Drive
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Washington, 4.....703 Atlantic Building
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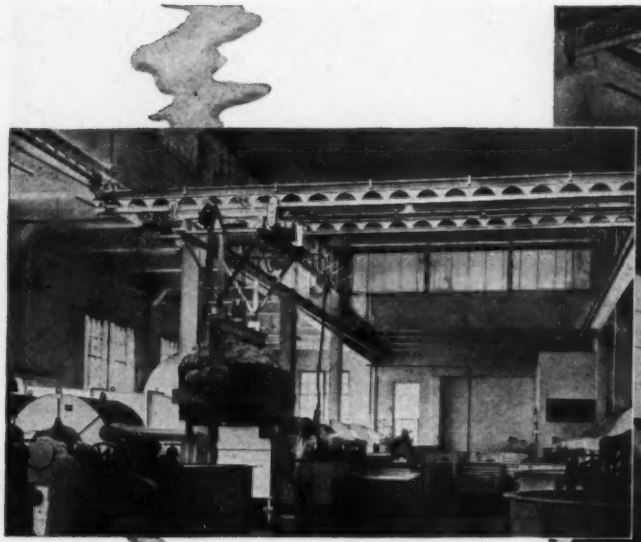
Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PENNA.

In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.



The Ecusta Paper Corp. beater room is served with double-girder, 4-ton, power-driven Cleveland Tramrail Cranes.

A special motor-driven roll-over box grab is provided for each crane. The pulp is emptied into the beaters simply by pressing the button. Boxes are easily locked into the grab by use of a crank.

Major Part of Nation's Cigarette Paper Handled on Cleveland Tramrail

Most likely the paper in the cigarettes that you smoke was transported on Cleveland Tramrail equipment at the great mill of the Ecusta Paper Corporation, Pisgah Forest, N. C. The major part of the nation's needs is produced here. Ecusta paper is used by all the leading cigarette manufacturers.

Cleveland Tramrail cranes and overhead rail system serve almost every department. Automatic roll-over grabs empty boxes of pulp into beaters and digesting machines. Heavy rolls of finished paper are handled in the cutting room with Cleveland Tramrail roll grabs. All equipment is completely motorized.

Only because of Ecusta's foresightedness is it possible to obtain needed supplies of quality cigarette paper. The paper that formerly came from France, of course, is unobtainable.

By planning ahead, Ecusta is the leader in its field today. Other companies who will be leaders in their fields tomorrow are laying the groundwork now. Cleveland Tramrail is aiding many of them in the preparation of modern, efficient methods for handling materials. If you are looking for ideas, you will find that your local Cleveland Tramrail engineer has a wealth of information to offer you.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

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THE CLEVELAND CRANE & ENGINEERING CO.
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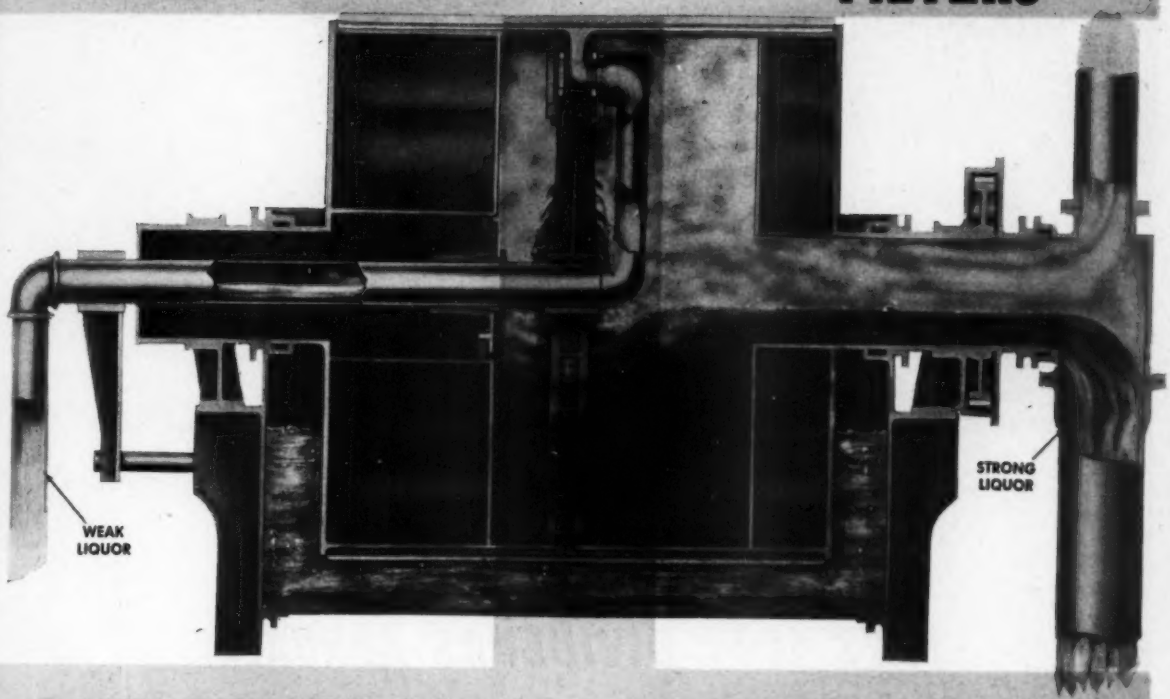
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

OLIVER *Ringvalve* VACUUM PULP FILTERS



ONE CENTRALLY LOCATED VALVE

provides—

(1) short liquor travel
(2) direct flow with no piping
(3) separation of liquid and air in drum
(4) less friction loss

resulting in——

(1) high capacity
(2) uniform sheet formation
(3) economical recovery of chemicals
(4) high washing efficiency

8-OUF-1

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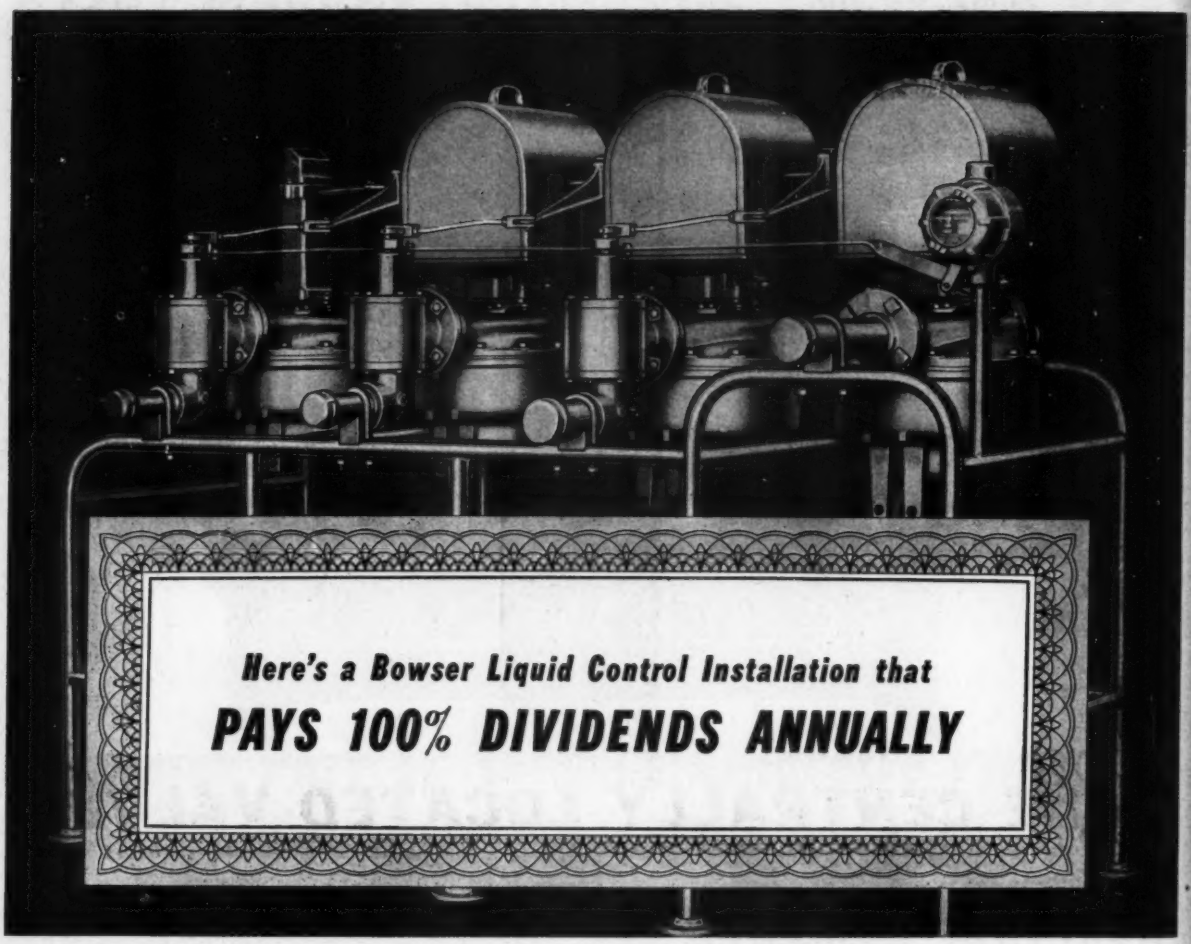
Oliver Ringvalve Vacuum Pulp Filters are the industry's Brown Stock Washers—Deckers — Bleach Washers — Washer Thickeners and High Density Thickeners. They are the filters you will want right now or in your post-war plant.

Another of our series of FACTS-F106—gives full details of the Oliver Ringvalve Filter. Send for a copy.



When plant equipment can be written off in three or four years, that's a good record. When it can be written off in less than a year . . . and pays 100% dividends thereafter . . . it's likely to be Bowser Liquid Control Equipment. Here's a typical case history:

A nationally-known plant in New York State installed a Bowser 2-meter Soluble Oil Proportioner (with piping and pumping equipment) for grinding and cutting solutions used in seven different departments. Previously the solutions were mixed in open drums and distributed manually.

RESULTS . . .

1. Three laborers, one for each shift, were released for other work. Estimated annual saving—$9,360.00.
2. Soluble oil consumption was reduced 10%. Estimated annual saving—$900.00.
3. Space for two storage drums was saved in each of seven departments. The proportioner and tanks in the oil house take only 30 square feet.

The first year's savings on labor and oil far more than paid for the entire installation. After that, it's "velvet".

That is only one phase of Bowser Exact Liquid Control, of course.

In the Paper Industry, for example, Bowser Lubrication Systems for dryers, calender stacks, Jordans, hydrafiners and turbines have been the almost universal choice for many years. Virtually all pulp and paper mills in the United States and Canada, as well as many in Europe, are Bowser-equipped. Also widely used are many smaller Bowser units, such as force-feed lubricators, oil filters for steam engines, flow indicating devices, etc.

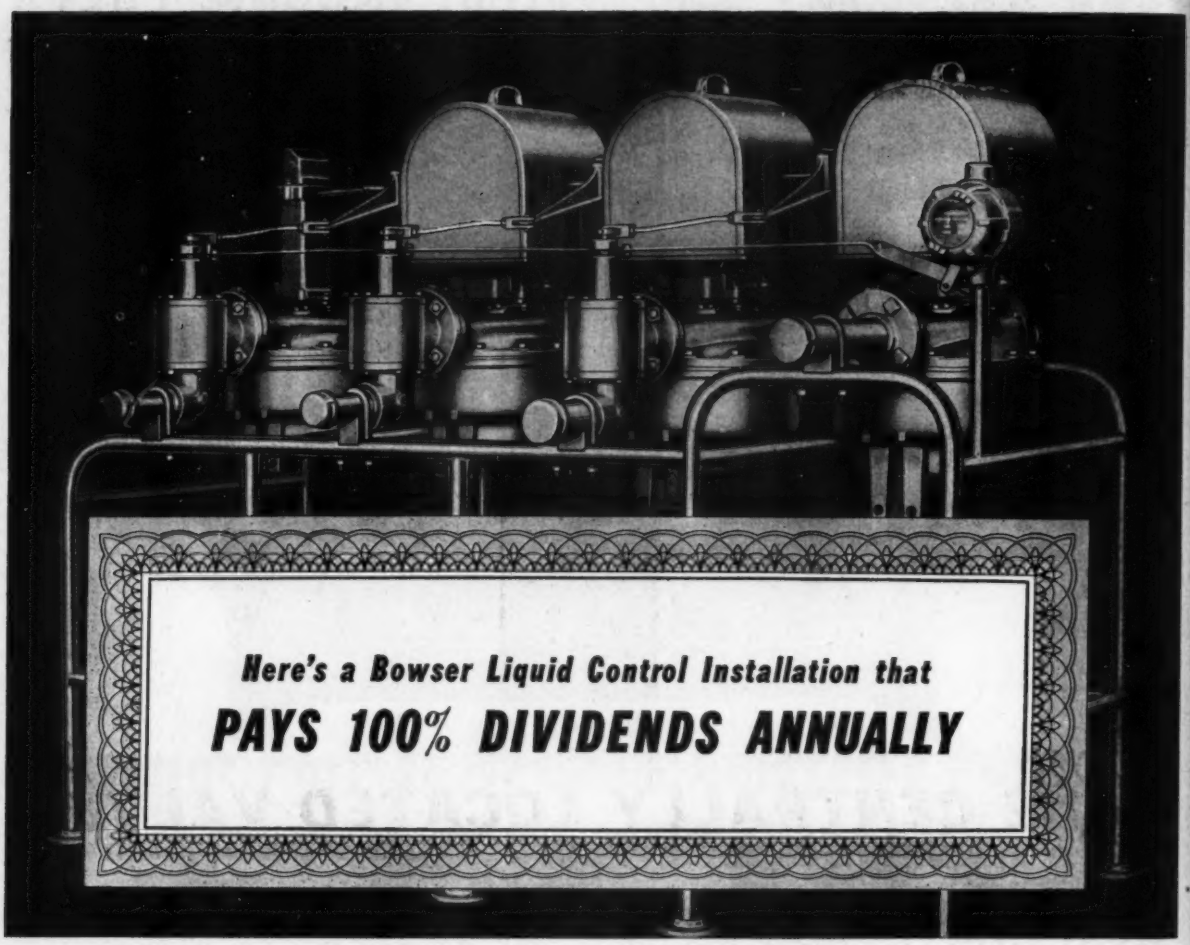
A major reason for Bowser's dominance is that Bowser installations are engineered to meet the exact requirements of the mill. BOWSER, INC., Dept. 16-E, Fort Wayne 2, Indiana

Not only has Bowser's war production earned the Army-Navy E . . . Bowser equipment has helped earn it for scores of other companies.

BOWSER ESTABLISHED 1885

BUY WAR BONDS

The Name That Means Exact Control *of Liquids*



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BOWSER ESTABLISHED 1885

BUY WAR BONDS

The Name That Means Exact Control *of Liquids*

Sutherland

CONTINUOUS BEATING and REFINING SYSTEM

★

1 SUTHERLAND

ONE (1) SUTHERLAND ALONE completely treats stock for 50 ton Fourdrinier making Bristol, label and specialties.

SUTHERLAND REFINER CORPORATION

TRENTON, NEW JERSEY

the JONES SCREEN

for providing well-screened stock

GEARED FOR WAR PRODUCTION

Jones

E.D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills

The light is always green at POWELL

At Powell, scientific study, research and experimentation *never* STOP. That's why Powell Engineering has always been able to solve the intricate flow control problems imposed by new products and processes.

Add to this our non-stop application of lessons learned through 99 years of practical experience and you have the Powell Line—a complete line of valves of every type and material needed to satisfy all flow-control requirements of industry today. And tomorrow, as new demands arise, there'll be Powell Valves to meet them.

Fig. 9061WE—Class 900-pound Cast Steel Swing Check Valve, with welding ends and bolted cap. Disc is hung on a 5-degree angle, and when wide open permits full, unobstructed flow through the valve body.

Fig. 1303 WE—Class 1500-pound Cast Steel Gate Valve, with welding ends, outside screw rising stem, bolted flanged yoke and taper solid wedge.

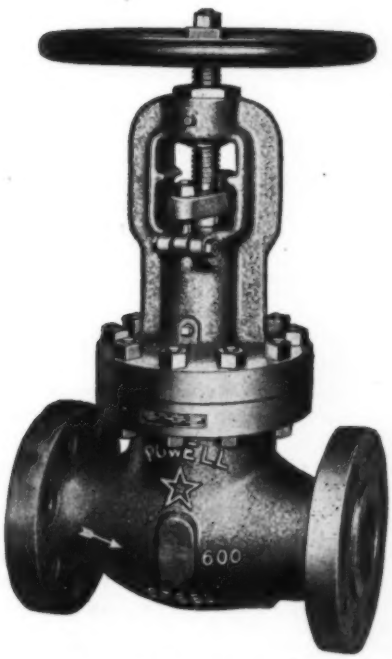


Fig. 6031—Class 600-pound Cast Steel Globe Valve, with flanged ends, outside screw rising stem and bolted flanged yoke.

The Wm. Powell Co.

Dependable Valves Since 1846

Cincinnati 22, Ohio

POWELL VALVES

SHOCK TREATMENT

for slime control

every Saturday:

To prevent acclimatization of slime organisms to their toxic environment, many mill superintendents are using *a double dosage of Santobrite once every week or ten days.*

This "Shock treatment," combined with regular use of 0.1 to 1 lb. of Santobrite per ton of paper produced (depending upon operating conditions) has proved highly successful in controlling slime, fungi and bacteria. And gone with these organisms are the costly degrading slime spots, breaks, blinded wires, plugged and rotted felts, clogged water lines, and dirty stock that can take the profit out of any paper mill's books.

Santobrite is chemically stable, and, used properly, is safe to mill workers and users of the mill's products. It is non-corrosive to equipment, non-volatile, and comparatively odorless.

For complete technical information on Santobrite and its current availability, write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis 4, Missouri.

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

Plant Superintendents: Write for instructive bulletin: "Santobrite For Micro-Organism Control in The Pulp and Paper Industry."

The bulletins shown are typical of the engineering service Falk renders to industry.

The Phrase FALK ... A GOOD NAME IN INDUSTRY Possesses Tangible Values For You!

The individual sale of a product is incidental. The service which that product renders is all-important . . . All-important to the buyer, because the continued satisfactory performance of that product confirms his judgment in purchasing it . . . All-important to the seller, because the satisfaction rendered the buyer enables the manufacturer to make sale after sale.

Falk products have been rendering a satisfactory service to industry for over 50 years. It is this satisfactory service that has enabled The Falk Corporation to continue, and to progress. It has enabled the buyer to depend on Falk claims for its products, and to depend on the performance to be secured from those products.

This is what we imply when we say: "Falk . . . a Good Name in Industry." That phrase includes the Falk philosophy of doing business, its policies, its research, its engineering skills, its production facilities, its service to industry, to its community, and to its employes. All this has given the Falk name a tangible value; and this tangible value has been meticulously maintained.

You who buy Falk products have acclaimed Falk a good name in industry. The fact that you were jointly responsible for this good name automatically provides you with values that would not otherwise be available.

Therefore we say "Falk . . . a Good Name in Industry" possesses concrete value, and carries the assurance that "it always pays to consult Falk."

THE FALK CORPORATION, MILWAUKEE 8 WISCONSIN

IT ALWAYS PAYS TO CONSULT **FALK** . . . A GOOD NAME IN INDUSTRY

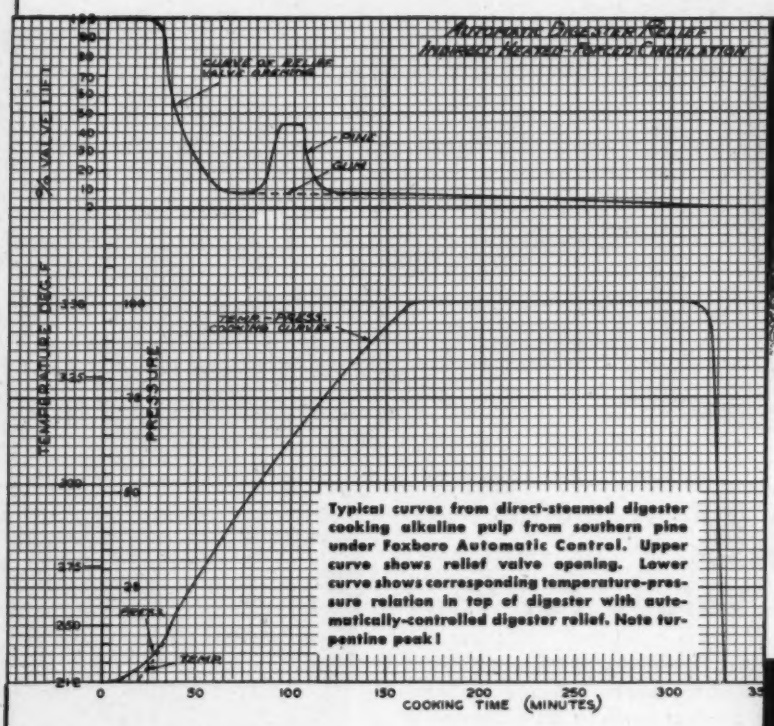
For over fifty years Precision Manufacturers of

Speed Reducers • Motoreducers • Flexible Couplings • Herringbone and Single Helical Gears • Heavy Gear Drives
Marine and Diesel Engine Gear Drives and Clutches • Steel Castings • Contract Welding and Machine Work.

District offices, representatives, or distributors in principal cities.

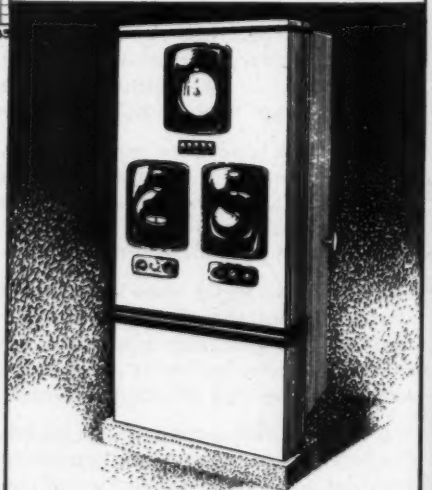
EXTRA PULP PROFITS

from a Compact, Engineered "Package"!



Typical curves from direct-steamed digester cooking alkaline pulp from southern pine under Foxboro Automatic Control. Upper curve shows relief valve opening. Lower curve shows corresponding temperature-pressure relation in top of digester with automatically-controlled digester relief. Note turpentine peak!

Foxboro Automatic Digester Control Unit for fast cooks. Top instrument is Foxboro's new electronic Dynalog Temperature Recorder . . . faster-acting, more sensitive. Beneath is Foxboro Digester Relief Controller. Its action is governed by measurement of temperature-pressure relation in relief gas.



Foxboro Automatic Digester Control Unit for slow cooks requiring controlled rate of temperature rise. Dynalog Temperature Recorder at top. Beneath are Foxboro Digester Relief Controller and Foxboro Cooking Schedule Controller with cam-set control point.

A Foxboro Automatic Digester Control System offers higher fiber yield, lower alkali consumption

Consider what you'd stand to gain if your yield-per-digester could be stepped-up 1% . . . or even 1/10 of 1%. That will give you a rough idea of the *extra pulp profits* many mills are now getting from installations of Foxboro Automatic Digester Control Systems!

These efficiency-boosting control systems are designed as complete units, readily adaptable to any type of alkaline digester installation. Automatically, they maintain such close control of cooking time, temperature and relief that wasteful operating variations are held to new minimums. Steam, chemical and labor requirements are reduced . . . both pulp quality and uniformity are substantially improved.

Write for complete information on these new Foxboro "packaged profit-builders" for alkaline pulp digesters. Also details of similar Foxboro Control for sulphite processes. The Foxboro Company, 158 Neponset Avenue, Foxboro, Mass., U. S. A. Branches in principal cities.

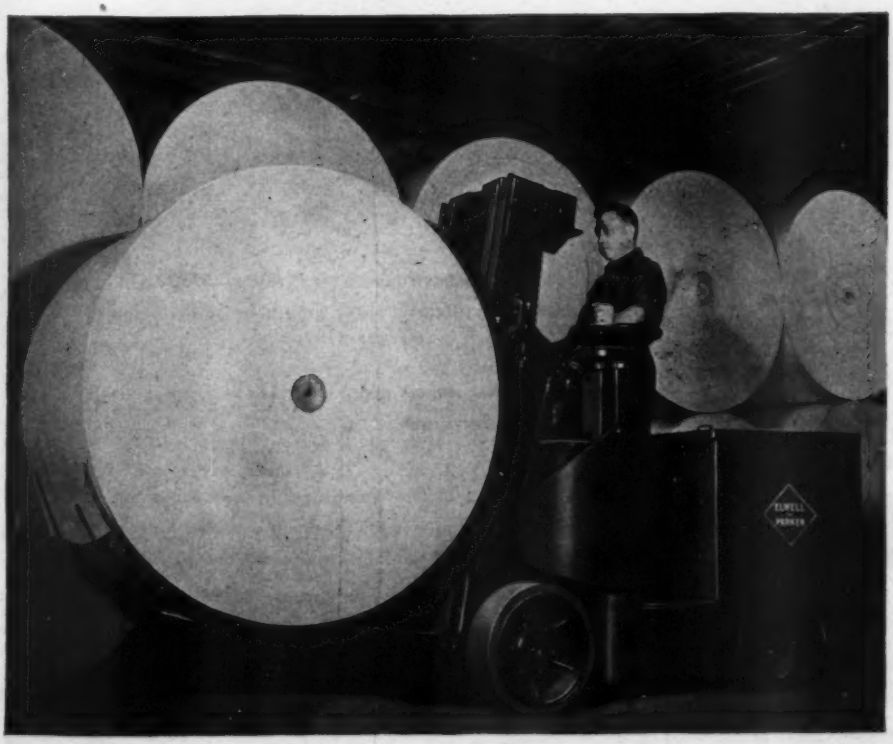
FOXBORO
REG U S PAT OFF

Automatic
DIGESTER CONTROL

Will *Your* Mill Share in Paper's Greatest Expansion?

Elwell-Parker can help you to expand your Load Units—*with profit*

EXPERIENCE teaches that for many Mills the greatest savings still are to be earned through the handling of larger and still larger tonnages of pulp, paper and converted products on each Truck Trip. And experience *proves* that Elwell-Parker can supply the Engineering Knowledge, the Successful Experience and the available Field Representation to provide the correct Truck or Crane System for handling *your* increased Mill Loads at top speed—safely—and without waste of time, manpower or money. The Elwell-Parker Electric Co., 4241 St. Clair Avenue, Cleveland 14, Ohio.



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New York	COR 7-0797
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WORM

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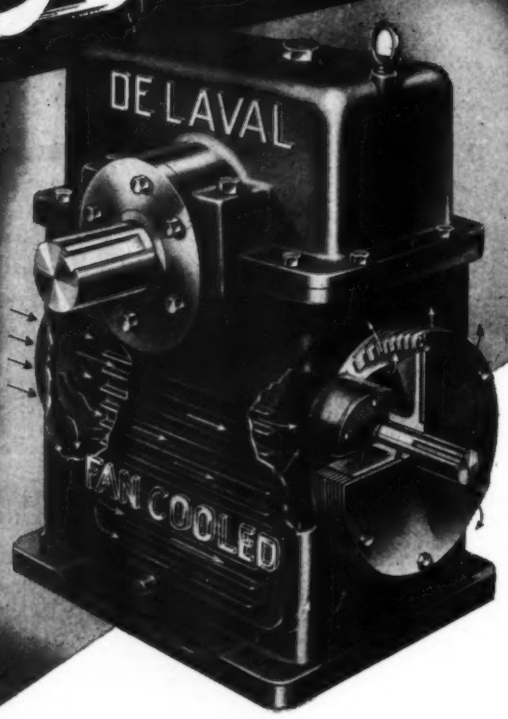

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Capacity is approximately doubled for all ratios at 1750 r.p.m. as compared with standard heavy duty units of the same frame size.

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Operation at higher ratings permits the use of correspondingly smaller and less costly units.

SMALLER SIZE

Reduction of as much as two frame sizes in some instances. The use of smaller, lighter units results in a saving both of floor space and of critical materials needed for the war effort.

The *NEW* DE LAVAL *FAN-COOLED* WORM GEAR SPEED REDUCER

will soon be available in a complete line of sizes. Send for literature now being prepared.

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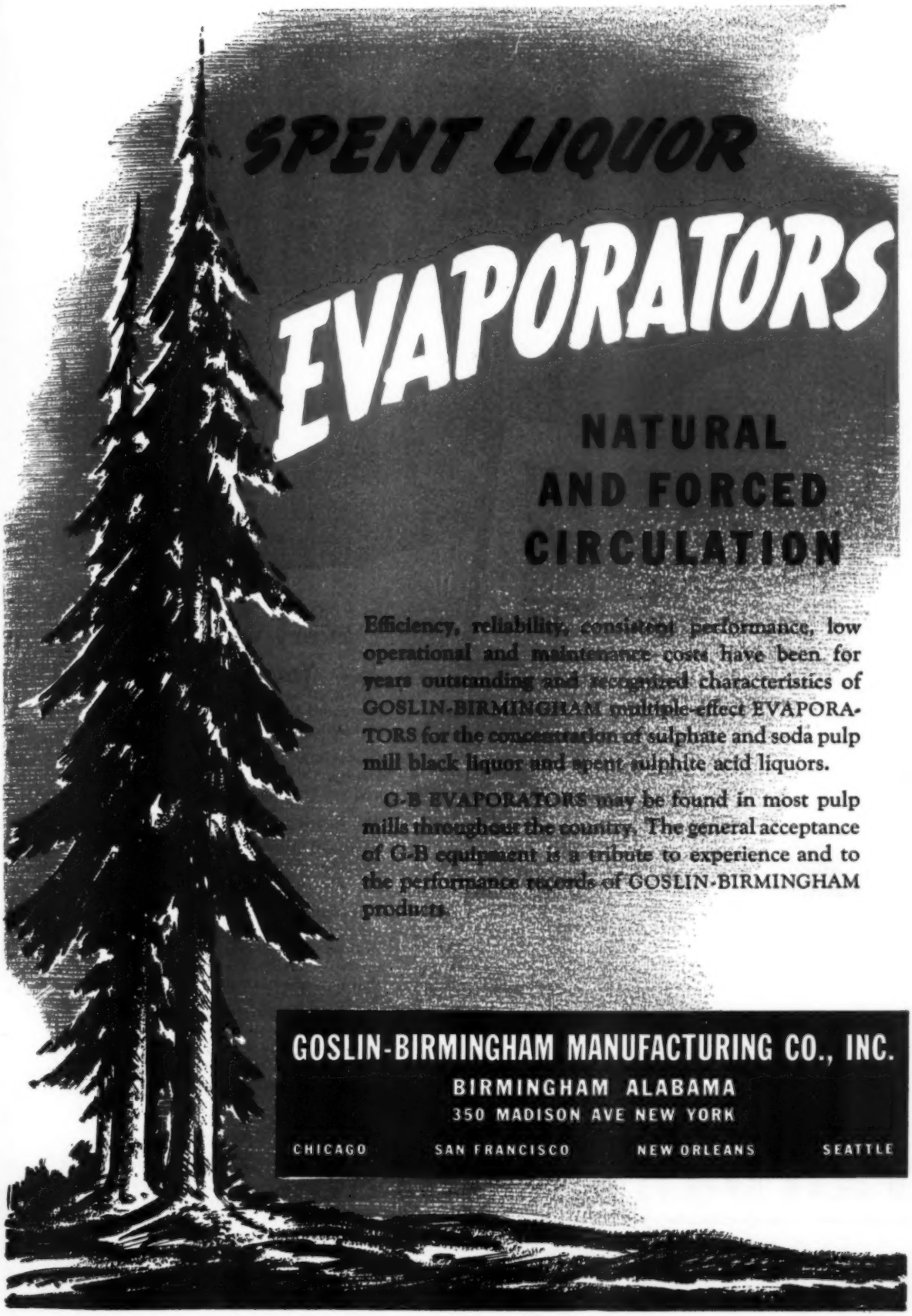
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Efficiency, reliability, consistent performance, low operational and maintenance costs have been for years outstanding and recognized characteristics of GOSLIN-BIRMINGHAM multiple-effect EVAPORATORS for the concentration of sulphate and soda pulp mill black liquor and spent sulphite acid liquors.
G-B EVAPORATORS may be found in most pulp mills throughout the country. The general acceptance of G-B equipment is a tribute to experience and to the performance records of GOSLIN-BIRMINGHAM products.
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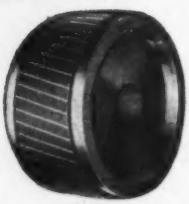
The Only Motor with a *Copperspun* ROTOR



Only in Fairbanks-Morse Motors will you find rotors centrifugally cast in *one piece*—and of *copper!*

The characteristics of copper make it the ideal rotor material. Copper has high electrical and thermal conductivity (twice as good as aluminum), greater strength, and low thermal expansion.

The indestructible copperspun rotor, with its better electrical characteristics, puts the new Fairbanks-Morse Motor far ahead of the times in stamina, in protection, and in versatility.

See a demonstration of what this motor can do for you. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

Every Good Feature You Could Ask!

Protected Frame—Excludes dripping liquids and falling particles.

Cross-flow Ventilation—Another exclusive feature. Air moves in both directions, providing uniform cooling—no hot spots.

Ball Bearings—Sealed in and protected.

Recessed Conduit Box—An innovation for neat installations in close quarters. Conventional box also provided.

Adaptability—Frame gives protection in any mounting position because the vented bearing brackets can be turned to four positions 90° apart. Reversible frame permits locating conduit box on either side.

Balanced Characteristics—A 40°C. motor with high efficiency and power factor, and excellent starting and accelerating torques.

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A name worth remembering

Diesel Locomotives • Diesel Engines • Generators • Motors • Pumps • Scales
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Don't use Valves that strangle your pipe lines...

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ROUND PORT VALVES ON THE JOB

(STRAIGHT THROUGH PLUGS)

HERE'S WHY:

- *Full, unrestricted* pipe area handles heaviest, most difficult ladings.
- Quickly opened, valve becomes exact continuation of pipe.
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- Available in sizes ½" to 8".

Representatives in principal cities carry adequate warehouse stock for quick delivery.

SOLVES LADING PROBLEMS — Tar, sludge, grouting, asphalt, viscose, rayon, nylon, granular solids, paints, paper pulp, pulp while in process, black liquor, white liquor, caustics, acids and similar viscous or waste materials are all handled efficiently. Send for Catalog #3-P.

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VALVE DEPARTMENT

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"His Truth Is Marching On"

An American soldier, who has made a real sacrifice for his country, has returned from the war. He and his little son look out over the Pacific Ocean—the great ocean which is named for peace—where far away beyond San Francisco's Golden Gate Bridge the fight against an enemy still goes on. Out there many brave American soldiers still carry on the war, and until that last enemy is conquered and its vicious armies disarmed there can be no world peace.

This Golden Gateway to the United States may become historic—it may take on a far greater significance and symbolize the gateway to a permanent world peace. Upon the successful culmination of the United Nations' Peace Conference hinges the destiny of future generations.

With the peace of the world secure, the threat of war will disappear, and the hundreds of thousands of brave men who have fought and died to win that peace will have bequeathed to the youth of all nations that priceless heritage—*Freedom.*

As true today as then are the words from Lincoln's immortal Gettysburg address: "It is for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion."

TRADE WINDS

Day Did not End the War-Need for Paper

PRECEDING HIS FORMAL proclamation of Victory in Europe, President Truman addressed the people of the Nation by saying, in part:

"If I could give you a single watchword for the coming months, that word is—work, work, work.

"We must work to finish the war. Our Victory is but half won . . .

"When the last Japanese division has surrendered unconditionally, then only will our fighting job be done.

"We must work to bind up the wounds of a suffering world—to build an abiding peace, a peace rooted in justice and in law.

"We can build such a peace only by hard, toilsome, painstaking work—by understanding and working with our Allies in peace as we have in war.

"I call upon every American to stick to his post until the last battle is won.

"Until that day, let no man abandon his post or slacken his efforts."

This emblem is the official insigne of the Mighty 7th War Loan which opens in May and continues through June.

The liberation of thousands of prisoners of war in Europe, and later in the Philippines was anticipated by the American Red Cross the first of this year when it began to pack "release kits." Packed in stout fiber cartons for shipment these kits are now being distributed.

Intended to make each freed prisoner's trip home more comfortable, the "release kit" bears a message to the recipient and includes among other things, cards, stationery, and a book. Shown above are three South Carolinians liberated from a prison camp at Bad Orb, Germany.

"Victory in Europe will not end the pulp and paper shortage." This quotation is from statement by Benton R. Cancell, director of the Forest Products Bureau of the WPB, and will be found on another page in this Section.

V-E Day has become history, but there is another Victory to be won. We must continue to produce paper and board until complete Victory comes.

The U. S. Victory Waste Paper Campaign is still gathering force. The Executive Committee in charge of the campaign states that:

"It is very difficult to understand why *one war* can consume as much paper as two, but the recent information we get from Washington indicates this will be the case in our war against Japan."

Edwin S. Friendly, chairman of the Newspaper Committee of the Waste Paper Campaign, received a letter from the WPB outlining this critical situation. An excerpt from this letter states that:

"The salvage of wastepaper is presently more important than ever. We dare not have a relapse following a cessation of hostilities in Europe. The demand for shell containers is at the highest it has been since the war began. No cutback is in sight on this item after Victory in Europe. We urge that the American Newspaper Publishers Association encourage Paper Troopers to carry on after schools close, and throughout the summer. The Double-V-Waste Paper Program is a new and perpetuating incentive which should be maintained."

Supply and Use Figures of Pulp, Paper and Board Compared

▶▶▶ War-boosted demands for wood pulp, paper and paperboard have increased faster than the country's total supplies, Benton R. Cancell, director of War Production Board's Forest Products Bureau, explained recently in making public a tabular breakdown of the supply and planned use of these commodities for the second quarter of 1945 in comparison with similar data for 1940, 1941 and 1944.

Table I shows the supply and use of the wood pulp from which paper and paperboard are made.

Mr. Cancell further explained the tables as follows:

The estimated wood pulp supply in the second quarter of 1945 is somewhat higher than in the average quarter of 1944, considerably higher than in 1940 quarter, and only slightly lower than in the average quarter of the record-breaking year 1941. Wood pulp use is planned at a level higher than that of 1944, and considerably higher than that of 1940, although below that of 1941, when users of wood pulp were able to draw heavily upon inventories that are no longer available. Wood pulp exports in the second quarter of 1945 are at only half the 1940 level, and approximately three-fourths of the 1941 level, though somewhat higher than that of 1944.

The largest percentage of change in wood pulp use occurred in the non-paper field, where requirements have almost tripled since 1940. The increase, however, is accounted for almost entirely by the use of wood pulp for the manufacture of explosives and high-tenacity rayon for the tire program. The quantity of wood pulp available for paper and paperboard production in the second quarter of 1945 is almost as high as the 1944 average, and considerably higher than the 1940 average quarter, although substantially below the record year of 1941. Table II shows that the estimated supply of paper and paperboard in the second quarter of 1945, comprising domestic production plus imports (chiefly newsprint), is far in excess of the 1940 average supply, somewhat above the 1944 supply, but somewhat below the average quarter of the record-breaking year of 1941. Supplies of paper (excluding paperboard) will be the lowest since 1940, while constantly expanding paperboard production should reach a new high level in the second quarter of 1945.

The great increase in paperboard production has been necessitated primarily by the tremendous demand for domestic shipping containers, as well as by large demands for ammunition containers, bomb bands, K-ration boxes, and the packaging of other military items. Because of the use of more waste paper and other waste materials, it is expected that more paper and paperboard will be produced per ton of virgin wood pulp used in the second quarter of 1945 then in the past.

Wood pulp, paper and paperboard supplies have not decreased, but are currently very close to the highest levels in our history. Of the total estimated supply of wood pulp in the second quarter of 1945, not over two per cent will be exported to our Allies and to countries in the Western Hemisphere. Fully 98 per cent of our wood pulp supply will be consumed in the United States.

During the second quarter of 1945 the United States expects to import more than four times as much wood pulp as we expect to export. Since all our wood pulp imports now come from Canada, and since Canada probably would have to supply those countries we are now supplying if we were to reduce our exports, any such move on the part of the United States would result in decreased imports, and would hence not mean a larger supply of wood pulp for domestic consumption.

With respect to the distribution of paper and paperboard supplies, Mr. Cancell stated that military requirements would cut deeply into the overall supply in the second quarter. The impact of military requirements will be felt in many grades of paper as well as paperboard. In the paperboard field, for example, the large war needs for fiber shipping containers (V-boxes) for overseas shipment will cut heavily into the total supply of kraft pulp and containerboard. The approved exports of paper and paperboard for the second quarter represent only a small part of our total new supply. In all probability, such exports will not substantially exceed three per cent of our new supply, leaving about 97 per cent of our total supply available for consumption in the United States.

Concerning supply problems, Mr. Cancell said: "The War Production Board recognizes that in spite of the high levels of paper and paperboard production it has been able to maintain, shortages have been and will be felt by civilians in many categories. The printing and publishing trade has already felt the pinch, as have retail merchants and even some industrial users. It is believed, however, that when American business and American consumers understand fully the necessity and the inevitability of these shortages, the required sacrifices will be made cheerfully.

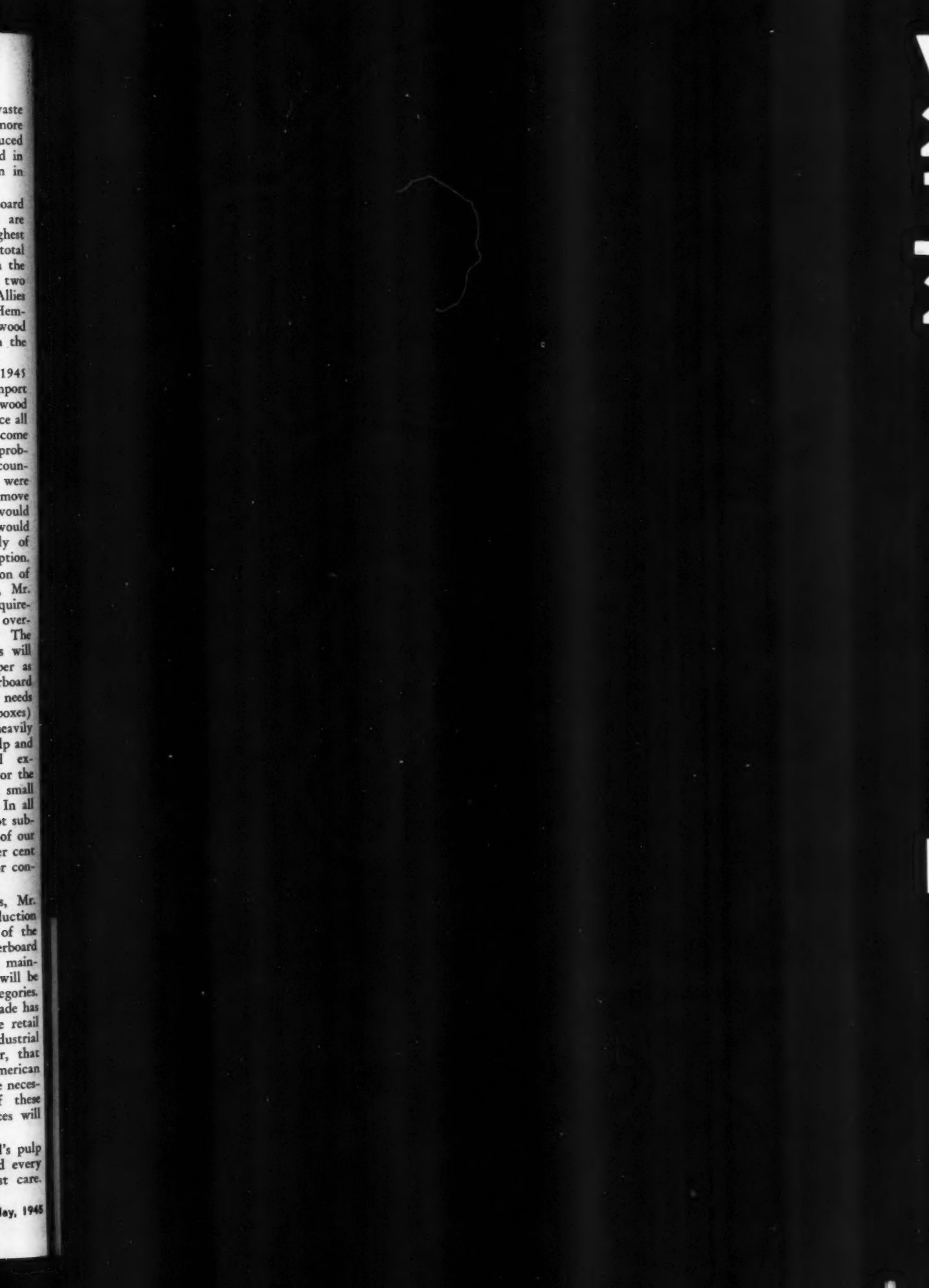
"The War Production Board's pulp and paper program is prepared every three months with the utmost care.

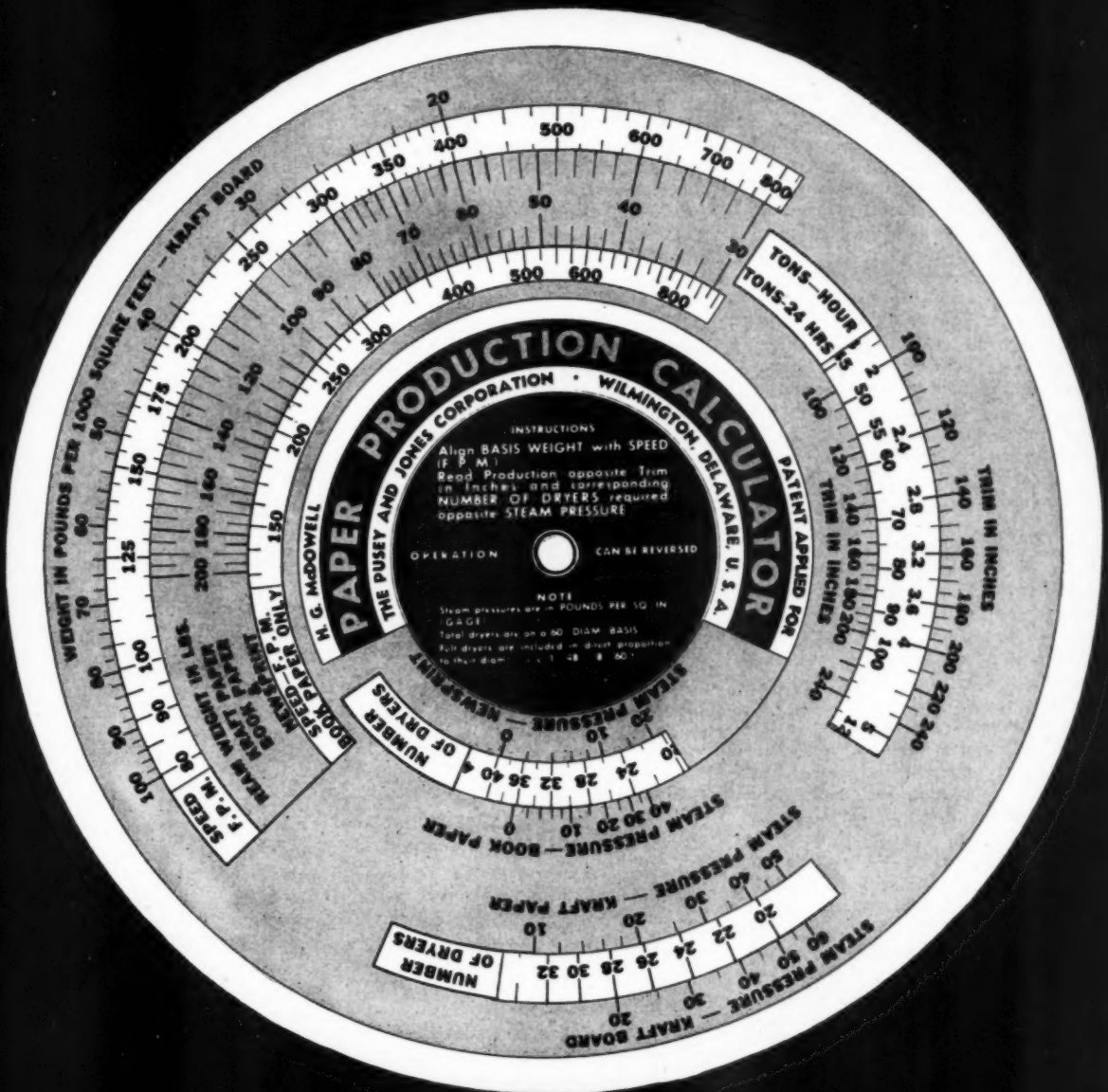
Table I—Wood Pulp Supply and Use
(In thousand tons)

	Average Quarter			(Program) 2nd Quarter
	1940	1941	1944	1945
Wood Pulp Supply	2,546	2,884	2,784	2,855
Dom. Production	2,240	2,594	2,522	2,592
Imports	306	290	262	263
Wood Pulp Use	2,631	3,006	2,812	2,843
Paper and Paperboard	2,445	2,841	2,622	2,600
Non-Paper	65	83	141	182
Export	121	82	49	61

Table II—Paper and Paperboard Supply
(In thousand tons)

	Average Quarter			(Program) 2nd Quarter
	1940	1941	1944	1945
Paper and Paperboard	4,325	5,210	4,940	5,020
Dom. Production:				
Paper	2,009	2,340	2,055	1,951
Paperboard	1,612	2,100	2,241	2,420
Imports (Chiefly newsprint)	770	700	644	649




PAPER PRODUCTION CALCULATOR
THE PUSEY AND JONES CORPORATION · WILMINGTON, DELAWARE, U. S. A.
PATENT APPLIED FOR
H. G. McDOWELL
INSTRUCTIONS
Align BASIS WEIGHT with SPEED (F. P. M.)
Read Production opposite Trim in Inches and corresponding NUMBER OF DRYERS required opposite STEAM PRESSURE
OPERATION
CAN BE REVERSED
NOTE
WEIGHT IN POUNDS PER 1000 SQUARE FEET — KRAFT BOARD
BOOK PAPER SPEED
BEAM WEIGHT IN LBS.
BOOK PAPER
KRAFT PAPER
SPEED F. P. M.
TONS—HOUR
TONS-24 HRS.
TRIM IN INCHES
NUMBER OF DRYERS
STEAM PRESSURE — NEWSPRINT
STEAM PRESSURE — BOOK PAPER
STEAM PRESSURE — KRAFT PAPER
STEAM PRESSURE — KRAFT BOARD

GET THIS TIME SAVER! . . . Let this new Puseyjones Paper Production Calculator do your figuring for you—quickly and accurately. Tell it (1) the basis weight and type of paper to be made, and (2) the speed of your machine, and it will tell you immediately—at a glance—the production per hour (or per day) and the number of dryers required for the job . . . Calculator sent FREE to interested members of your organization. Write us your requirements.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

Every effort is exerted to increase the supply so as to meet the needs of the war and the war supporting economy to the maximum possible extent. To increase supply, pulpwood cutting drives have been carried out, prisoners of war employed, paper salvage drives put on and maximum imports arranged. In distributing supply, the relative essentiality of the various uses and users has been carefully weighed."

All requirements for pulp, paper and paperboard are examined by the War Production Board Requirements Committee, on which are represented the Army, Navy, War Food Administration, Office of Civilian Requirements, Foreign Economic Administration, and other interested Government agencies. When total claims exceed the available supply, as is the case in the pulp and paper field, these claims are carefully examined or "screened" and reduced to the point where balance with available supply is effected. Should the various claimant agencies be unable to agree unanimously on the program, the conflicting views are reviewed and reconciled by the committee. In the course of the preparation of the pulp and paper program, full consideration is given to the information and the reports channeled to War Production Board from all over the country from a variety of sources, including the producing mills. The result is a program designed as the best possible compromise with the realities of war.

Victory in Europe will not end the pulp and paper shortage, Mr. Cancell said. Although military and export requirements for pulp, paper and paperboards may decline somewhat, it must be anticipated that over-all needs will continue to be high for a long time to come. WPB has made, and is continuing to make, every effort to insure that pulp and paper will be shipped from Sweden and other Scandinavian countries at the earliest possible moment, and that a fair share of such supplies comes to the United States, he said.

◆

ANNOUNCE METHOD FOR PRODUCING BUTYL ALCOHOL FROM SULPHITE LIQUOR

A method for producing butyl alcohol from sulphite liquor has been announced by Dr. Bror L. Grondal, professor of forest products at the University of Washington, and Major Henry W. Berger, research chemist.

The results of the two years of research will include: (1) elimination of wastage of 50 per cent of every log cut for pulp mills; (2) the elimination of water pollution through dumping of sulphite liquor; (3) a new, cheap source of butyl alcohol from sulphite liquor; (4) a completely new kind of fuel; and (5) a new source of yeast fodder for the dairy farmer.

Dr. Grondal said the recovery of these substances from the liquor is accomplished by "comparatively simple, inexpensive processes or precipitation, fermentation and distillation, with a sufficiently high yield of the materials to make it highly advantageous to the industrialist from an economic standpoint."

Mr. Berger states the development of the process for producing butyl alcohol from the wood pulp was "just a matter of diet for the bacillus that does all the work. We had to add certain chemicals directly to the raw liquor which would leave the available sugar behind, and then our problem was to get rid of the inhibiting materials which hampered normal growth of the bacillus, which, in turn, prevented his conversion of the sugar to the alcohol and acetone."

This process should not be confused with that employed by the new Bellingham (Wash.) plant of the Puget Sound Pulp and Timber Company, which manufactures ethyl alcohol, as contrasted to butyl, from woodpulp products.

◆

CENTRAL STATES PAPER & BAG CO. BUYS NEW BLDG.

As a part of its postwar planning program, the Central States Paper & Bag Company, St. Louis, recently purchased a three-story buildings which will greatly increase the efficiency of the company's facilities and organization. The new building will accommodate all of the production and office equipment and around 800 employees which the company now has divided among three separate units throughout the city.

The building is particularly well adapted to the type of manufacturing done by Central States company. One special feature being planned is an ample display room, fitted and designed to show the company's many products. New machinery, purchased to increase productive capacity, will be placed in the new quarters as soon as possible.

Although the company is still actively turning out almost 100 per cent war production, plans are now being made to convert to peacetime production with items formerly manufactured and new ones as soon as changing conditions will permit. The company manufactures many unusual paper bags for war use and lend-lease needs.

The two items which follow are reproduced from the April 28 issue of *Foreign Commerce Weekly*, published by the U. S. Department of Commerce.

CHINA PAPER CORPORATION MAKES POSTWAR PLANS

The problems arising from wartime contingencies, which have made the importation of vital foreign commodities out of the question and brought paper production within the country practically to a standstill, are being used as a basis for postwar planning by one of China's large paper-manufacturing concerns, the China Paper Corporation.

If present projects are carried through, the company should emerge after the war as the dominant factor of the Chinese paper industry. Even now under the management of specialists trained in foreign universities and with 90 per cent of the paper experts of the country as stockholders, it easily represents the outstanding organization of its kind in China.

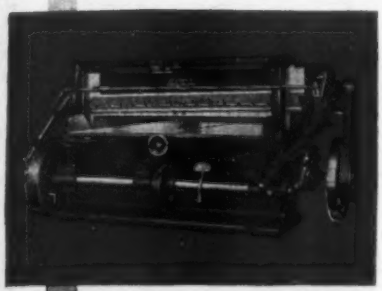
The immediate program of the company includes arrangements for the visit of the general manager to the United States to confer with American pulp and paper manufacturers on postwar developments in the Chinese paper industry; the placing of orders for the purchase of paper-manufacturing machinery; the securing of complete information on the American paper industry; and initiation of a promotional campaign to interest American firms in the Chinese paper market. To facilitate the purchase of American made paper manufacturing machinery, the sum of $700,000 in United States currency has been built up for use as initial payments.

The company has indicated its desire to secure the assistance of American capital and technical advice and setting up new paper mills and to this end is inviting American firms to participate in the establishment of these projects. It is also anxious to act as an agent for any American firm desiring to enter the Chinese market. Representatives of American firms will be welcome in China, but in the event that they are unable to make the trip the corporation is willing to send its officials to the United States upon the invitation of American companies.

◆

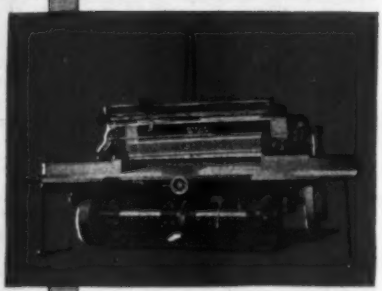
BOARD FROM SUGARCANE TRASH MADE IN INDIA

Experiments during the past 4 years in the manufacture of cardboard from sugarcane trash have proved so successful in India that a small commercial plant has been established at Ravalgaon. The plant is equipped



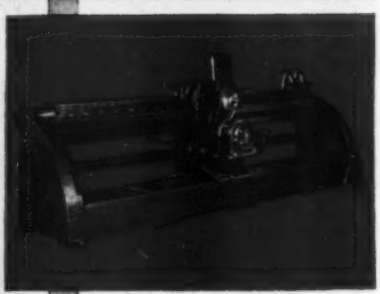
CUTTER

I'm a precision *machine*
Of massive design.
For accuracy—tops!
For speed—super fine!



SPACER

For making a series
Of accurate *cuts*
I'm a time-saving guy
With plenty of guts!



GRINDER

Keen, true edges
That's my trade
With minimum waste
On any straight blade!

The SEYBOLD Reserve Order Plan is a carefully considered method of assuring delivery of SEYBOLD machines to first-comers when we are permitted to go into peacetime production. Mail the coupon and we will forward the full details.

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Harris-Seybold-Potter Company, 220 Luckie Street, Atlanta, Ga.

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Harris-Seybold-Potter, Ltd., 445 King St. W., Toronto, Ont., Canada
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819 Washington St., Dayton F-7, Ohio

Please send us your Purchase Proposal form which gives complete details of your Reserve Order plan.

*Date*_____

*Name*_____

*Address*_____

*City*_____ *State*_____

with pressure digesters, edge runners, beaters, screw presses, and calenders, states the foreign press. Well-cut trash is treated in the pressure digesters with sodium hydroxide or a mixture of carbonate and lime for about 10 hours at a pressure of from 25 to 30 pounds per square inch, after which it is washed free of alkali and passed through an edge runner. If intended for wrapping paper, the pulp is again subjected to the action of the beater. When the pulp has been pressed in the screw presses, the resulting cardboard is dried and pressed in calenders, then cut to size and packed for marketing.

The quality of cardboard produced in this manner is claimed to be far superior to that made from rice straw, wheat straw, or bagasse and furthermore the cellulose content of the trash is so high—about 40 per cent—that a 600-ton sugarcane factory can provide enough raw material for a cardboard plant having a year-round capacity output of 10 tons a day.

◆

RIVER RAISIN PAPER CO. AWARDED ARMY-NAVY "E"

On April 23, the River Raisin Paper Company, Monroe, Michigan, was awarded the Army-Navy "E" pennant for high achievement in producing materials needed for war.

A fitting presentation program was held, the presentation of the award being made by Major Nelson W. McCormick, chief, Security Division, Detroit Ordnance District. Charles L. Wood, vice president and general manager of the company, accepted the pennant.

PAPER INDUSTRY ASKED TO CO-OPERATE ON ALL TRANSPORTATION PROBLEMS

The pulp, paper and paperboard industries have been asked to co-operate on all transportation problems in an effort to relieve the present car shortage, the War Production Board said recently.

Members of the Pulp, Paper and Paperboard Transportation Industry Advisory Committee, in session recently, were told that, while the most serious of the problems was a freight-car shortage of between 18,000 and 20,000 a day, the lack of suitable trucks and tires also was hindering receipt of supplies and delivery of paper products by many paper mills. Facilities for shipments by water on the St. Lawrence River and the Great Lakes were said to be adequate for delivery of pulpwood from Canada.

Car loading figures have dropped below those of last year, and some decline in average carloads was reported. The average weight per car has shown a steady decline the past year. The industry was urged to see to it that all cars used were loaded to capacity with paper, paperboard and paper products, material to fill Government orders, which some members had previously believed did not call for full car shipments. WPB transportation officials emphasized the necessity of obtaining special permits when shippers are unable to meet Office of Defense Transportation 18-A and 18A-1 loading requirements, regardless of who the purchaser may be.

Outlining some of the other essential car-utilization factors, officials mentioned the following: advance shipment planning, specification of exact number of cars required, anticipation of unloading from either side of cars, expeditions loading and unloading, early release of cars both loaded and empty, careful cleaning of unloaded cars, and utilization of Sundays and Saturdays for loading and unloading cars where practical.

The over-all transportation problem, due chiefly to the present uneven distribution of cars and the truck and tire shortage, will probably extend for a year after V-E Day, it was predicted.

Following the announcement of the retirement of Frank Hufford, government presiding officer of the meeting and transportation consultant for the Paper and Paperboard Divisions, who is leaving the War Production Board to return to the paper industry, the committee unanimously recorded a vote of thanks to Mr. Hufford for his earnest service in behalf of the industry and WPB.

Changes in the committee membership included the retirement of Robert Henderson, of the Minnesota and Ontario Paper Co., and Harry Ratliff of the Champion Paper and Fiber Co.

William Thornton of Kimberly-Clark was named as a new member of the committee.

PULPWOOD RECEIPTS FOR MARCH LOWER THAN LAST YEAR—CONSUMPTION UP!

Total pulpwood receipts at United States paper and paperboard mills in March amounted to 1,486,113 rough cords, 2.5 per cent below total receipts a year ago, according to a statement released by the War Production Board Forest Products Bureau recently.

Over-all pulpwood consumption in March, 1945, increased 7.4 per cent over that in March, 1944, but inventories showed a decline of 15.9 per cent, WPB officials said.

Receipts by the five regions showed a decline over March, 1944, except in the South, where an increase of 18.3 per cent was noted. Consumption in the various regions was from 4.6 to 10.9 per cent higher than a year ago, except in the Appalachian region, where a slight decrease was reported. Inventories at the end of March showed a decline running from 12 per cent in the South to 23 per cent in the Appalachian area.

The accompanying table shows March receipts, both domestic and Canadian, and consumption and inventories by regions, compared with March figures a year ago.

United States Receipts, Consumption and Inventory of Pulpwood by Regions
March 1945 (Rough Cords)

Region	Receipts			Consumption	Inventory
	Domestic	Canadian	Total		
Northeast	204,714	67,903	272,617	291,285	699,864
Appalachian	119,041	250	119,291	121,367	215,631
Lake States	233,874	36,131	270,005	229,080	1,246,690
South	640,332	.....	640,332	623,345	155,343
Pacific Northwest	176,690	7,178	183,868	226,585	328,373
Total U. S.	1,374,651	111,462	1,486,113	1,491,662	2,645,901

◆

NEWSPRINT CHANGES MADE EFFECTIVE BY OPA-WPB

The question of newsprint has again come to the front in a big way during the past month. The Office of Price Administration has authorized an increase of $3 per ton in ceiling prices, but the newspapers have been ordered by the War Production Board to cut their orders 6 per cent effective immediately. Prospects for obtaining additional paper during the last half of the year were discussed by members of the War Production Board's Newspaper Industry Advisory Committee, and it is hoped that in that

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period Canada will be able to ship between 5 and 6 per cent more paper despite increasing demands for her products. The supply depends on manpower, weather, and the coal supply. England's increased demands are expected to be met by Scandinavia, but Australia will be calling for a larger tonnage. A conference has been arranged for June 4 at Montreal for a reopening of the proposal to make newsprint at a 30-pound basis weight.

▶▶▶ ON LEAVE FROM the office of president of the Scott Paper Company, Thomas B. McCabe has been given the highly important post as active director of the Army-Navy overseas surplus property disposal program as Commissioner of the Office of Army-Navy Liquidation.

▶▶▶ THE OPA HAS FORMED an Over-All Paper Industry Advisory Committee consisting of: H. S. Daniels, Union Bag & Paper Corporation; Grafton Houston, Fort Howard Paper Company; Malcolm Lowe, Lowe Paper Company; J. L. Riegel, Riegel Paper Corporation; Harold Smith, Maine Seaboard Paper Company; H. R. Weaver, International Paper Company; W. J. Dixon, St. Regis Paper Company; V. C. Hobbs, Fibreboard Products, Inc.; Vasco E. Nunez, Nashua Gummed and Coated Paper Company; Rex W. Hovey, Oxford Paper Company; W. Irving Osborne, Jr., Cornell Wood Products Company; Arthur Schroeder, Pejepscot Paper Company; D. L. Stocker, Michigan Paper Company; J. D. Zink, Strathmore Paper Company; and J. D. Zellerbach, Crown Zellerbach Corporation.

▶▶▶ THE TIGHTER PAPER SUPPLY has brought forth four new orders relative to printing papers. Basis weights have been ordered reduced on several commercial printing, book and writing papers. Magazine publishers must reduce their average consumption to 87 per cent of that used in 1944, and book publishers to 85 per cent. Commercial printers must cut their consumption to 87 per cent of the 1944 usage. Other orders tighten the use of paperboards.

▶▶▶ THE WAYS AND MEANS Committee of the House of Representatives began hearings April 18 on the bill to permit the extension and expansion of the Reciprocal Trade Agreements Act. The first witnesses were high officials of the State Department and other Government representatives, all of whom urged that "tariff-barriers" should be reduced. About 100 witnesses have been scheduled to appear, and the hearings are taking much more time than was originally planned.

▶▶▶ WPB HAS AUTHORIZED improvements of $42,000 at the Grays Harbor Division of Rayonier, Inc., Hoquiam, Washington. A transit sheathed steel frame roof between two buildings and a concrete floor will be among the improvements. A rotating leaf pressure filter with necessary pumps, motors, etc., also will be included.

▶▶▶ DEPUTY DIRECTOR of the Paperboard Division of the WPB is the appointment just given to W. Irving Osborne, Jr., of Chicago. Mr. Osborne is president of the National Paperboard Association, the Hummel and Downing Company, Milwaukee, Wisconsin, and the Cornell Wood Products Company, of Chicago. He will be chief assistant to Ralph A. Powers, director of the Division.

◆

★★★★ NOW FLY ON "E" FLAG AT HAMMERMILL PLANT

The men and women of Hammermill Paper Company, Erie, Pennsylvania, have won the Army-Navy Production Award for the fifth time for continued "outstanding services in the production of war equipment."

The new award adds the fourth White Star to the "E" pennant which flies over the plant.

◆

TREE FARM PROGRAM GAINS

The American tree farm system is gaining 23 new operations, sponsored by the Western Pine Association, comprising 420,265 acres in California, Idaho and Montana, it has been announced by Stuart Moir, association chief forester.

Total area in the Western Pine tree farm system will be 1,979,905 acres. Official recognition will be given this program in industrial forest management in June, when Governor Warren of California will dedicate 16 such operations near Placerville, California, known collectively as the Eldorado tree farms.

Nationally, the tree farm program continues to make steady gains. On April 1, 777 certified tree farms contained 9,446,300 acres, compared with 722 such areas, with 9,302,330 acres, on January 1. The Mississippi tree farm system recently added 18 operations, with more than 33,000 acres, and, in Texas, 11 more tree farms,

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with nearly 28,000 acres, were added. The Southern Pine Association, which sponsored these operations, now has 689 tree farms under its jurisdiction, with 5,853,770 acres.

Paying tribute to the tree farm activities of the West Coast Lumbermen's Association, another sponsoring group, the *New York Times*, recently declared that "tree farming in the Northwest has proved economically sound. Millions of acres in other areas of the nation are primarily suited to growing trees."

◆

M AND O SETS UP TWO SCHOLARSHIPS AT THE UNIVERSITY OF MINN.

Two scholarships for the study of agriculture, forestry and home economics at the University of Minnesota in the 1945-46 school year will be awarded to graduates of high schools in Koochiching county by Minnesota and Ontario Paper Company which operates mills in that county.

To be known as *Mando* scholarships, these aids will be financed by the Company as a move to encourage study of modern forestry, agriculture and home economics. Students, to be eligible, must have been graduated from a high school with creditable marks.

Arrangements for the scholarships were completed through Dr. Schmitz, dean of the college of agriculture, forestry and home economics at the University of Minnesota.

Applications will be accepted from Koochiching county high school seniors and awards will be made by a University faculty committee on the basis of scholastic ability, qualities of character and leadership, and financial needs of candidates.

◆

FINANCIAL

Securities prices on the stock exchanges rose rapidly during the past month to figures higher than the averages reached for eight years, and paper mill securities shared in the advance. The speculative nature of the advances, however, is shown by the fact that the most pronounced price rises were in common stocks, and not in the interest bearing securities held by purchasers for income from dividends. The speculative trend is so pronounced that authorities are considering close restriction of margin provisions, and already securities valued at less than $10 per share can only be purchased for cash, and not on margins.

Brown Company—Net profit for

UNSKILLED LABOR ADDS NOTHING TO A PRODUCT EXCEPT COST
CLARK
CLARK Gas Powered FORK TRUCK
CLARKAT 2,000 to 2,600 lb. D.S.F.
CLARKTOR-6 2,100 to 5,000 lb. D.S.F.
CLARK ELECTRIC FORK TRUCK 1,000 to 7,000 lb. capacity
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INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS
METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

the fiscal year ended November 30 was $1,298,244, as against $1,126,415 in the previous fiscal year.

Philip Carey Manufacturing Company—Net profit in 1944 was $709,706, as against $706,902 in 1943.

Container Corporation—Net income for the quarter ended March 31 was $479,045, as against $569,517 in the same quarter of 1944.

Continental-Diamond Fibre Company—Net income for 1944 was $380,119, as against $575,848 in 1943.

Eaton Paper Corporation — Net profit in 1944 was $187,130, as against $126,196 in 1943.

Robert Gair Company—Net income for the quarter ended March 31 was $205,830, as against $133,591 for the same quarter in 1944.

Gaylord Container Corporation—Net profit in 1944 was $1,075,805, as against $1,103,097 in 1943

Great Northern Paper Company—Net profit for 1944 was $1,666,978, as against $1,859,895 in 1943.

Hinde & Dauch Paper Company—Net income for the quarter ended March 31 was $306,494, as against $323,459 in the same quarter of 1944.

Hollingsworth & Whitney Company—Net earnings in 1944 were $581,777, as against $522,403 in 1943.

International Paper Company—Net profit in 1944 was $8,447,953, as compared with $8,413,808 in 1943, but sales increased 7 per cent.

Mead Corporation—Net earnings for the twelve weeks ending March 24 were $247,120 as against $245,217 for the comparable period in 1944.

Minnesota & Ontario Paper Company—Net profit for 1944 was $1,125,287, as against $1,463,806 in 1943. The shareholders will be asked at the coming annual meeting to authorize a refunding of the company's bond issue of $6,000,000 6 per cent income bonds by the issuance of the same amount in 3 per cent bonds.

Nekoosa Edwards Paper Company—Net income in 1944 was $494,371, as against $552,192 in 1943.

Paraffine Companies—Net income for nine months ended March 31 was $1,500,264, as against $1,417,047 for the comparable period in the preceding fiscal years.

Rayonier, Inc.—Net profit for the nine months ended January 31 was $4,386,617 as against $3,032,070 in the same period of the previous fiscal year.

Sutherland Paper Company—Net profit for the quarters ended March 31 was $140,429, as against $169,981 for the comparbale quarter in 1944.

Taggart Corporation—Net profit for the comparable quarter in 1944. $584,321 in 1943.

New York Stock Exchange—Stocks

	Closing Prices April 25	March 25
A.P.W. Products ..	*4½-4¾	4¾
Celotex	16	15
Same Preferred..	20¼	20
Certain-teed Prod..	8½	7½
Same Preferred..	*148½-150	145½
Champion P&F Co.	33½	30
Same Preferred..	112	111½
Container Corp. ...	29¾	27
Cont. Diamond ...	11¾	10⅜
Crown Zellerbach..	22⅝	20⅜
Same Preferred..	*104-104½	103½
Dixie Vortex	23	17½
Same "A"	48	47-48
Robert Gair	5⅞	5⅛
Same Preferred..	17¼	16⅛
Gaylord Container.	29	24½
Same Preferred..	*60-60½	*56-58½
International Paper.	24¾	21⅜
Same Preferred..	89½	88⅛
Kimberly-Clark	45	41¾
McAndrews & Forbes	*32-33	32
Masonite	45¼	40
Mead Corp.	13¾	12½
Same Preferred..	*101-103	*101½-104
National Container.	15⅜	14
Paraffine Cos.....	63	64½
Same Preferred..	109	109
Rayonier, Inc.	18½	16
Same Preferred..	37	35⅝
Scott Paper 47½-47¾		*43-44½
Same 4½% Pref. *109½-112		109¼-112½
Same 4% Pref. 107¾-108¾		109¼-112
Sutherland Paper ..	33	32¼-33⅛
Union Bag & Paper	16⅜	14½
U. S. Gypsum.....	84	79⅛
Same Preferred..	190	186
West Va. P&P Co.	25	23
Same Preferred..111¼-113		111

New York Stock Exchange—Bonds

Abitibi 5%	103⅞	101
Celotex 3¾%	105¾	....
Certain-teed 5½%.	....	....
Champion P&F Co.	....	....
Intl. Paper 5%....	104	....
Same 6%	110	110

New York Curb Exchange—Stocks

Am. Writing	10¼	8
Great Northern ...	....	35¾
Hummel Ross	7¼	7⅜
St. Regis	5¾	....
Taggart	....	....
United Wall Paper.	4⅜	4⅜

*Closing Bid and Asked Prices.

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VALUABLE RESEARCH DATA WILL BE BROUGHT TO LIGHT

Research data of immense importance, much of which is buried in the many departments of the Technical Schools and Universities, is being unearthed for the first time. Master Theses are now being made available to industry. Information which is not easily accessible is being made available in carefully indexed form.

Through the co-operation of the leading Technical Schools and Universities, Master Theses that are of importance to Industry and Research, will be indexed in the technical "Digest-Index" issued by The National Research Bureau, Inc., 415 North Dearborn Street, Chicago 10, Illinois. They will be supplied on microfilm through the Library of Industrial Research, a non-profit organization, acting as clearing house for the exchange of Technical, Scientific and Management information. Many of the leading firms in the United States and Canada are members of the Library.

◆

DR. VAN PELT TO HEAD BATTELLE'S PROGRAM OF RESEARCH EDUCATION

To help America maintain its top-flight position in science, an expansion of Battelle Memorial Institute's program of research education is being planned, Clyde Williams, Battelle director, announced recently. Mr. Williams pointed out that the program will be of special interest to returning veterans who can qualify for training as research workers in the sciences.

Battelle's program of research education will be headed by Dr. J. R. Van Pelt, Jr., noted for his educational pioneering, and until recently technical director of the Museum of Science and Industry in Chicago. Dr. Van Pelt became associated with the Museum in 1928 to organize the department of geology, mining, and metallurgy—it was then known as the Rosenwald Industrial Museum. Two years later, he was named assistant director, and in 1940 he became technical director. After his appointment as assistant director, he toured Europe to study leading scientific museums as background for planning the building which now houses the Museum.

Dr. Van Pelt has a wide scholastic background and is the author of numerous articles and scientific works.

The program, which will be directed at the graduate level of education, is an expansion of the plan which has been markedly successful thus far with Ohio State University.

"America has been so busy in the last five years applying the old familiar laws of nature to military purposes that we have had too little time for discovering new scientific laws. Building new postwar industries and products for mass consumption depends on a steady flow of new basic knowledge. Furthermore, this new knowledge is vitally important for national preparedness in the future. Battelle's expanded plan of research education, built on fifteen years of experience in this field, is designed to add to the country's store of scientific knowl-

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Find out how simple Standard Coded Lubrication Service is to install and keep up. A Standard Oil Lubrication Engineer will be glad to discuss its application with those in charge of lubrication in *your* plant. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for a copy of the booklet or the Lubrication Engineer nearest you.

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STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

edge, as well as to train young scientists."

Thousands of veterans have become aware of the importance of technology from their battlefield experiences and will be interested in scientific or engineering careers. They are learning that scientific manpower is one of the country's key assets, and that the supply of such men is now, and will remain for years, critically short. Battelle Memorial Institute, in co-operation with other educational institutions, Williams declared, will give qualified veterans the finest possible training in scientific research on the professional level.

Dr. J. R. Van Pelt, Jr.

"Research education," said Mr. Williams, "is a familiar field for Battelle Memorial Institute. Hundreds of research men have been trained at Battelle, and many of those have carried its methods into the research laboratories of industry and into universities, government bureaus, and other scientific organizations throughout the country. The first Battelle fellowship was granted in 1930 and fellowships have been granted annually since that time. Another phase of Battelle's research education is the publication of the results of scientific research. These publications now total ten complete books, contributions in others, and more than 800 scientific papers and technical articles."

◆

▶▶▶ THERE IS A CRITICAL shortage of wastepaper and rags in Canada, and an intensified campaign for the salvage of these materials is now being conducted throughout the Dominion. There is an immediate need for an increase of 33⅓ per cent in the flow of wastepaper to the mills.

GREAT LAKES PAPER CO. WILL BUILD EXTENSION TO FT. WILLIAM MILL

The Great Lakes Paper Company Ltd. announces that it has received permission from the Controller of Construction in Ottawa (Canada) to proceed with the construction of an extension to the Fort William mill at a cost in excess of $300,000 for buildings and necessary equipment.

The extension will include a two-story dryer building in which will be installed a new pulp drying machine to operate in conjunction with an existing 120-inch Kamyr wet machine. A second 80-inch Kamyr wet machine purchased last year will be installed in the same building.

The company also will construct a pulp storage building complete with an adequate train shed building. A complete conveyor system to be installed will make it possible to transfer pulp to the company dock on the Kaministiqnia River.

Construction work already is under way, and the dryer is scheduled to be in operation before the end of the year.

◆

ECUSTA'S FIVE YEARS OF PROGRESS RECORDED IN ANNIVERSARY BOOK

The most recent issue of *The Echo*, company newspaper issued by the Ecusta Paper Corporation, Pisgah Forest, North Carolina, carries a picture of Club Sapphire, a beautiful recreation spot that has been the scene of a number of outings for the Ecusta family.

This fine property, bordering a beautiful lake, has been purchased by Harry Straus, president of the company, to be used as a recreation center for all Ecustans.

This is just one more forward step for this new but highly progressive company. The first of the year the Ecusta Corporation marked its fifth anniversary of production. A deluxe souvenir booklet entitled "The Fifth Anniversary Record of a New American Industry" was distributed by the company to mark its phenomenal progress within five short years. The book was printed on the company's newest product—a fine flax writing paper.

Besides turning out its famous Ecusta cigarette paper, the company has again broadened its field to include the making of fine paper from flax fiber. Some colored paper is being made, and it is expected that the volume of this paper will be steadily increased. Ecusta fine paper is particularly adapted to air mail use because of its light weight.

Briefs . . .

▶▶▶ THE REMOVAL OF the New York City office of the L. L. Brown Paper Company, Adams, Massachusetts, has been announced. This office, formerly located at 261 Broadway, is now located at 41 Park Row 7, Room 707, telephone number Cortlandt 7-1335. E. C. Chadwick remains in charge.

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▶▶▶ THE OPENING OF a sales office in Atlanta, Georgia, is announced by Kimberly-Clark Corporation, Neenah, Wisconsin. This office will handle creped wadding sales only —Kimsul, Kimpak, and Sanek. The office is located at 22 Marietta Street, N.W., Atlanta 3, Georgia, and it is in charge of R. V. Bellmore.

◆

▶▶▶ IT IS REPORTED that a provincial government (Canadian) airplane has been engaged to survey Saskatchewan timber areas in connection with a proposed pulp mill. Reports to the Resources Department had indicated that in some areas such as Hudson Bay Junction, timber suitable for lumber is largely gone, but a liberal supply of pulpwood remains. Resources Minister Phelps said that a pulp mill like other development projects would be financed by returns from the sale of provincial security bonds to finance industrial projects.

◆

▶▶▶ REFORESTATION WORK for the British Columbia Government calls for the planting of 9,000,000 trees, according to an announcement made in the B. C. Minister of Lands. He said that next year the forest service plans to plant 10,000 trees. He further stated that 7,850,600 trees were planted during 1944 on 10,302 acres of land. The total area now replanted is 44,400 acres on which 36,000,000 trees are growing.

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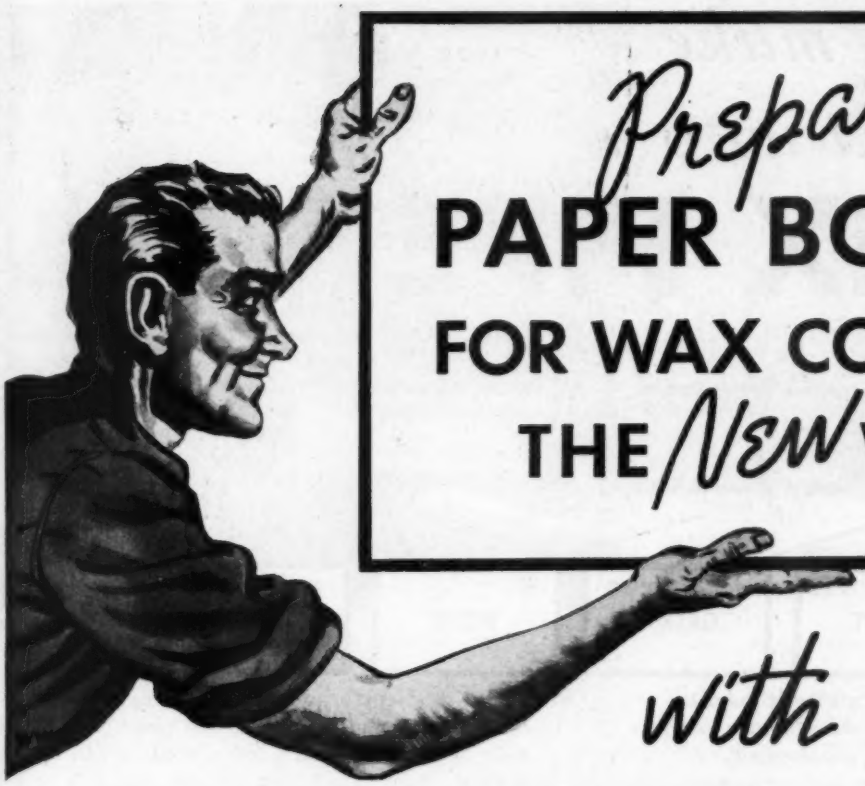
▶▶▶ A RETIREMENT INCOME plan for all permanent employees has been announced by Pacific Mills, Limited, Ocean Falls, British Columbia. The pension plan will be in conjunction with the Dominion Government annuities branch and is in conformity with the general trend of Canadian pensions. Pacific Mills is a Canadian subsidiary of Crown Zellerbach Corporation. The parent company also has installed a retirement program for employees of all U. S. operations.



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Here's a sizing material that's simplicity itself to use—and remarkably economical. Try KELGIN LV for the preparation of paper board for wax coatings—for gloss ink sizing.

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Making a tight joint with PYREX Pipe is easy. It's an A, B, C operation that any careful workman can perform. No special tools or training are required.

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1. Mount metal flanges on pipes before they are placed in hangers. Inserts can be handled easier if they are curled over sharp radius before insertion in flange.

2. Flanges should be pulled up on the inserts so that the metal flange face is nearly flush with the end surface of the insert.

3. Gaskets should be lined up with the inner surface of the pipe so that no part protrudes into the pipe to cause obstruction to flow. To avoid slippage, gaskets should be kept thoroughly dry during installation.

4. As the pipe lengths are put into place, tighten the flange bolts enough to bring the glass pipe ends snug against the gasket, but not enough to compress it.

5. When all pipes and fittings are connected and the line is complete, begin at fixed end and work to the opposite end tightening the flange bolts. Do this evenly and pull them up quite tightly. Use a 6″ or 8″ end-wrench if possible.

Once installed, PYREX Pipe brings to your processing operations many important advantages. Its transparency permits you to inspect product flow and condition at every stage of processing. Its resistance to thermal shock allows flushing of lines with steam or hot water for visible cleanliness. Its chemical stability virtually eliminates corrosion, contamination, scaling and pitting. It is rugged enough to meet plant operating conditions. For further information, write Industrial Sales Dept., PI-5.

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CORNING, NEW YORK

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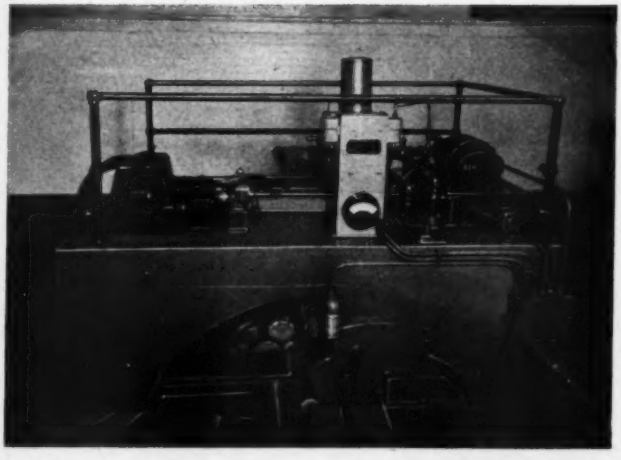
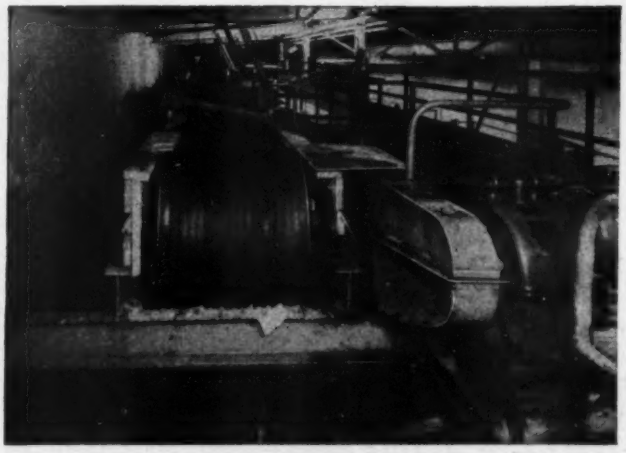
Pyrex
"PYREX" IS A REGISTERED TRADE-MARK
GLASS PIPE
AND INDICATES MANUFACTURE BY CORNING GLASS WORKS, CORNING, NEW YORK

EASY LOADING



One very important feature of the Roberts Grinder is the ease with which the wood is supplied. The loading operation is largely mechanical. Pulpwood is delivered directly to the charging door by a conveying system. The operator needs only to guide the wood into the feed pocket. One man can easily supply two adjacent grinders producing up to 100 tons of pulp in twenty-four hours. The illustrations show the loading side of a Roberts installation and how the conveying system is used in one mill. The wood is brought into the grinder room on a belt conveyor and is dumped into water-filled tanks in which it floats to the charging door. Roberts Grinders are adaptable to an efficient loading arrangement.

HELPS CUT GRINDER ROOM CREWS 50% TO 70%



Easy loading is one of the reasons for large labor savings with the Roberts Grinder. Less than half of the crew needed for a pocket type installation is required for the same tonnage with these new grinders. Fewer units are needed as one Roberts replaces three or four pocket grinders. Ease of loading helps maintain the large daily production now possible with high-speed continuous grinding. The wood conveying system also contributes to the clean and orderly appearance of these installations. It is a big help in maintaining good housekeeping. Now the grinder room can become a showplace of the mill. The Roberts Grinder catalogue gives full information on other advantages of this new equipment. Write for your copy.

THE APPLETON MACHINE COMPANY

APPLETON • WISCONSIN • *Eastern Sales Representatives: CASTLE & OVERTON, Inc., 630 Fifth Avenue, New York*

NORTON PULPSTONE
dependability—uniform rate of production, without shut downs. Low wearing rate that makes it possible to keep finger bars close to surface, preventing excessive loss from escaping shims. This means greater yield per cord of wood. And pulp ground by Norton stones always has lower percentage of screenings—negligible amount of shiners and coarse pulp.
NORTON COMPANY
Worcester 6, Mass.
NORTON
PULPSTONE
WHEN IT'S AN ABRASIVE PROBLEM, CALL IN NORTON ENGINEERING SERVICE
NORTON COMPANY
WORCESTER, MASS.

Dryer Felts

"Engineered" to Each Mill's Requirements

With experience in the manufacture of dryer clothing, dating back to the beginning of the modern paper dryer, HOOPERWOOD "Canvas Engineering" has produced not one but several distinct types of Cotton and Asbestos Felts.

This policy has been of real assistance to Paper Mill Superintendents, in suiting the particular requirements of their mill—even down to each machine position, if desired.

Therefore, if it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an Asbestos Felt to withstand the advanced temperatures involved in high-speed production of Kraft and other heavy papers—HOOPERWOOD "Canvas Engineering" has the answer to your problem.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

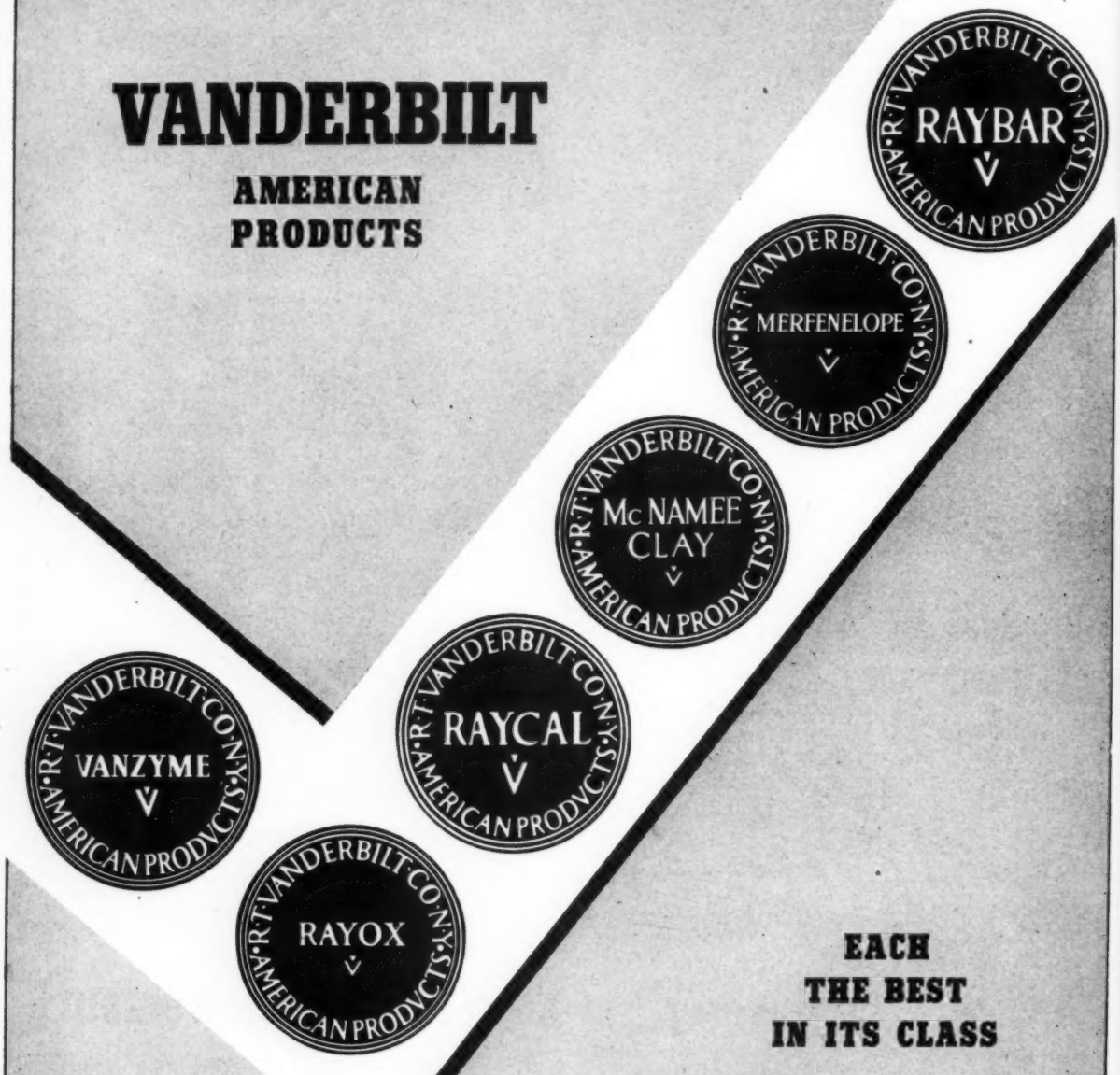
Mills: WOODBERRY, BALTIMORE, MD.

HOOPERWOOD DRYER FELTS

COTTON AND ASBESTOS

VANDERBILT

AMERICAN PRODUCTS



EACH THE BEST IN ITS CLASS

R. T. VANDERBILT CO., Inc.

230 Park Avenue, New York City

Editorial

Nazi Defeat and Paper Control

▶▶▶ OFFICIAL NOTICE that hostilities in Europe had ceased was not necessary, because in one way or another the arrival of V-E Day has already been celebrated in various Allied countries without any official notice—the intelligence and common sense of the people told them the end had come.

By the same token, they know that the demands for war materials are undergoing a swift and radical reduction. The reduction of demand for war materials for further European war operations has been going on for the past month or six weeks. The further pull on supplies from this country for armament for Europe has ceased. The Allies have stockpiles of all manner of armament and more than sufficient to cover all necessities. The diversion of supplies from the Atlantic to the Pacific area is already under way. The release of a heavy percentage of war production to civilian supply should be made without delay. We have plenty and to spare of production, geared up and operating to accomplish the conquest of Japan.

The reconstruction of American civilian supply must be the outstanding problem of the future.

America, if it is to maintain its leadership in global affairs must be strengthened by an all-out devotion to recuperation of the civilian population. That can only be done by an all-out production of American goods in American industries.

The reconversion of American industry will be swift in some lines, but slow in others.

The paper industry will not feel any relief for some time to come.

Paper is the number one shortage headache in the whole world. The world's production of paper is wholly inadequate to supply the activity of the reconstruction era.

Paper, through the control of the WPB Pulp Allocation Committee, will see no let-up of governmental control. The allocations are made every quarter of the year.

It is now the first of May. All pulps are allocated until July first and will not be changed. On May 5, the mills of this country submit to the War Production Board their prospective production of pulp for the third quarter of this year. The pulps will be allocated on much the same basis as they have been. Every mill will be required to make and ship its pulp and paper as the Pulp Allocation and Paper Section of the War Production Board direct.

There will be no more paper available to civilian end uses than has been available during the first half of this year. The probability is that there will be less. So, it is idle to indulge in wishful hoping that the termination of war in Europe will release more paper for civilian end use in this country.

The only thing which will release more paper for general consumption is the release of the controls by the WPB of the pulp allocation restrictions and the abolition of the OPA price regulation. These releases are not to be expected until the end of the Japanese hostilities.

◆

The Graphic Arts and Paper

▶▶▶ *Are We Headed For A Disastrous Postwar Paper Shortage?* is the title of a short discourse by George A. Britton that has been published recently under the auspices of Graphic Arts Unity Group, New York City.

In this discourse, Mr. Britton reviews the present paper situation in the Graphic Arts industry, and, in doing so, he does not present any too rosy a picture. He states in part:

"Let us remember that the Paper Industry of America, before the war, did its marketing in America—it grew up with our ever-expanding industrial, commercial, mercantile and consumer life. . . . It distrbiuted and warehoused standard stocks at strategic points for wholesale supply to every community. This round - the - clock service rendered to American business and labor is acknowledged to be a fundamental gear in the life of this nation; that it cannot now be interrupted without varying degrees of hardship, even to bankruptcies, and that it can be carried forward only by the highest concentration in scientific, chemical, mechanical, technical, productive and business organization.

"Who, then as an American, is prepared to accept the responsibility for export shipments wheedled out of our present low stockpiles—and willing to guarantee that no gaps in paper supplies shall exist during the coming postwar efforts of getting men to work immediately after hostilities cease?

"It becomes the duty of the Graphic Arts to unite and demand immediately, at least the rebuilding of its paper stockpiles."

Surely a graphic arts problem as it relates to paper is a problem of the papermaking industry. There is a satisfactory solution. May that answer be found!

◆

Little Things Often Overlooked

▶▶▶ THE IMPORTANCE of little things was dramatically portrayed to a Chicago press group on April 12, 1945. On that day, an all-day tour, sponsored by the Anti-Friction Bearing Manufacturers' Association in cooperation with the Air Technical Service Command of the Army Air Forces, sponsored an all-day tour of the plants of the Aetna Ball & Roller Bearing Company, Strom Steel Ball Company, and Ahlberg Bearing Company. (McGill Manufacturing Company, Valpariso, Indiana, also participated in the occasion, but the plant was not visited because of the distance from Chicago.)

The members of the party making these plant visitations witnessed the production and testing procedures used in the manufacture of balls and rollers for antifriction bearings and in the assembly of the bearings themselves. The manufacturing operations were fascinating; and the inspection procedures equally so.

Mass production and precision workmanship keynote all of the operations. Bearings used in aircraft instruments are produced at tolerances as fine as one-millionth of an inch.

The antifriction bearing has been called the "tremendous trifle." It is so easily overlooked; yet it is indispensable to machines of modern war and to many machines of industry.

The Super Fortress (B-29) contains approximately 3,500 antifriction bearings. The steel balls for the bearing of a Norden bombsight (only three being used for each bearing) are so small that 7,000 of them can be fitted into a level tablespoonful. The electric turbo-supercharger contains both ball and roller bearings that operate in temperatures ranging from minus 70 Fahr. to plus 350 Fahr. Some of these bearings permit an engine speed of more than 35,000 revolutions per minute.

The antifriction bearing industry may be justly proud of the reference to its products as the "tremendous trifle."

Current Thought

Retraining the Returned Serviceman

WILLIAM SIBLEY

▸▸▸ HAVING ONCE BEEN a considerable distance from home, doing what I could to "make the world safe for democracy" (as if the world had anything to fear of or combat with "democracy") I know that here and there, among cliques of soldiers, whether they be in Burma, Berlin, Berchtesgaden, or Brisbane, there is one disgruntled and misguided fellow who is holding forth to the rest of the fellows about the impossibility of finding a job when they are finally, at long last, discharged from service. It was so during the Civil War (according to my grandfather); it was so during the Spanish-American War (according to my uncle) and I know, from personal experience, that it was so during World War I. Human nature being addicted to following the calf-path, the lads in this war are not so different than the lads in other wars —and so, that sort of disturbing insistence on the part of the non-conformist still runs rife.

Of course the truth of the matter is that such worries are needless and without foundation. Former employers will take back into their fold every last one of the soldiers who went to war, whether willingly and eagerly, or hesitatingly and unwillingly. The fundamental character of employers hasn't changed during the past 95 years, either; and so, the returning soldier will find his old job waiting for him; at least, for the most part.

Speaking in the vertical pronoun (and who is there among us who doesn't love to talk about "I"?) the writer enlisted from Bismarck, North Dakota, out of the advertising department of the International Harvester Company. Upon my return to civilian life, the Company (at its Chicago headquarters) promptly assured me that I could go back to Bismarck and go to work—with my rail transportation and expenses paid. But, never having entirely fallen in love with that bleak city, I demurred. Whereupon the long-patient Harvester Company hunted around and found another place, of like character, at its Atlanta, Georgia, branch . . . Wee-ell, I'd never been to Atlanta, and I was averse to hot weather, and I didn't like to set up housekeeping in such a strange environment—and I —etc., etc. . . . Whereupon the Company shrugged its shoulders and said, in effect: "Look, hot shot—you can have your old job back, or you can take a similar position in Atlanta. Now, just what do you want to do?"

Whereupon, I went over to Dearborn Street and got a job as circulation manager for a trade journal which was rather prominent in its chosen field . . . And since then the Harvester Company has had to get along, as best it could, all these years without my impossible-to-evaluate services!

The point of that brief yarn is just this: my former employers not only offered to give me my old job, but bent backwards trying to satisfy me when I demurred. They were more than generous, and I have always carried a friendly spot in my heart for that "heartless corporation" ever since. They *more* than met their obligation to me; the which is what the great majority of employers will do for the men and women now being discharged.

Not the least of industries contributing manpower to the war has been the paper and pulp industry. Tens of thousands of those now in uniform have come from the mills and offices of this industry. Not long hence, the majority of those men and women will be returning. Just as a matter of course, they will be offered their old jobs back . . . Perhaps, even at a somewhat higher wage than the one they left, since even though wage stabilization during this war has been quite different than the lack thereof during the First World War, there may yet be some advance to recognize. And wherever so, that advance will automatically be recognized and assigned by the former employer . . . And so, you will have on your hands a former employee—but one who has been absent for 12, 24, 36, or even 48 months. What to do with retraining or re-grooving him to the job, is the big question before many employers. Perhaps to supply just a springboard of ideas in this regard, I make the following suggestions. They are set forth here merely to provide a basis upon which you can build your own "returned soldier program."

1: First, try to make him (and when I say "him" I mean also to include the courageous girls and women who have given so much of themselves in this war) feel at home. Things are bound to appear strange to him after an absence of a year or two. Make it a special point to see that he is introduced to his fellow employees. If possible (and for the love of Pete, *make* it possible) see to it that a member of the firm welcomes him personally—and do the introducing to the personnel who may have come to work since he went away. Make the former worker know that you are glad he is back! And be sincere about it!

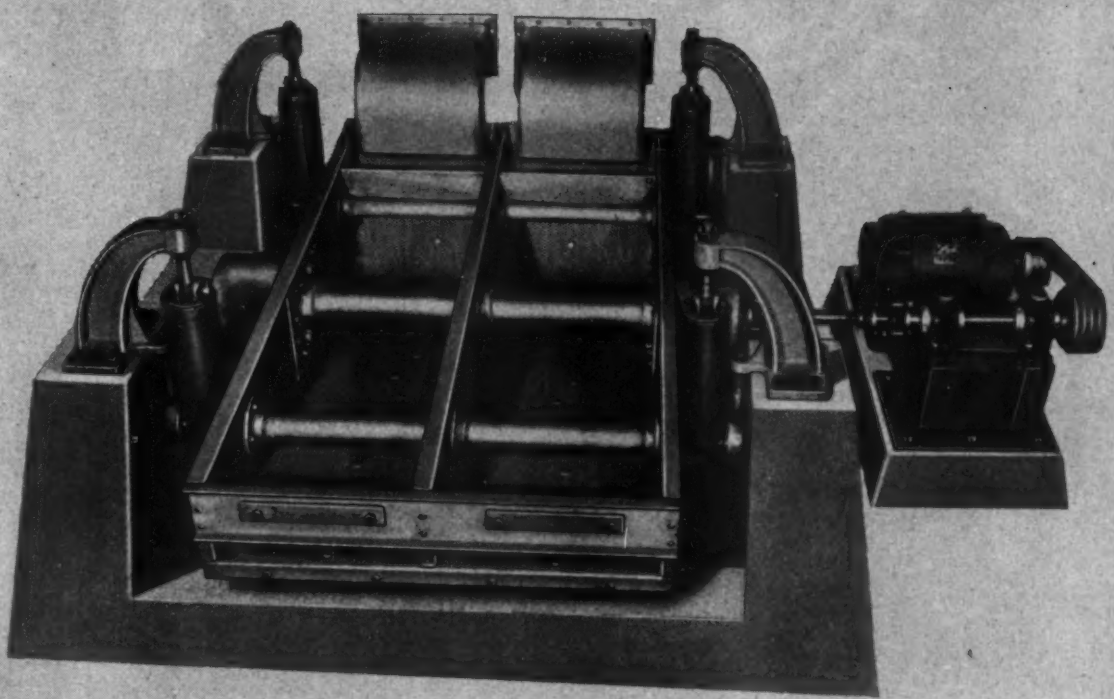
2: Some sort of explanation of the employee's new responsibility as a civilian is sometimes necessary (particularly to the ones who have been in service quite a time). Military life —where one lives under rugged conditions and unyielding discipline— tends to make one forget the niceties and courtesies we know at home. A caution along this line, tactfully done, will help many of the returned personnel to get back on the right track.

3: Point out to the returned veteran the changes in building or physical layout which have been made since he went away; tell him of the necessary changes in rules or company policies, with all of which he is unfamiliar. Show him the new machinery, the improved methods of doing things, the changed safety rules and why they were necessary. (If possible, explain to him the value of, or the gratifying records of, the changed safety rules.)

4: After rehiring the returned soldier (call him "soldier" or "sailor" if you *must*—but forget there ever was such a word as "veteran." For to *all* people who have ever been in the Armed Forces, the word "veteran" means the grand old men who belong to the G.A.R. Use the word "veteran" sparingly. Perhaps also, the words "soldier" or "sailor." The latter is a matter to decide with the individual). Give him time to familiarize himself with things in general. For best results, let him browse about, and thus get the hang of things as they are today, for himself.

5: Many returned service people will have difficult personal problems to meet. Encourage them to bring such problems to you. The slightest suggestion or implication of a "patronizing attitude" will ruin your effort in this regard. But if you can keep away from being patronizing or paternal—and give the returned service man real help in his social, marital, religious, or personal problems—you have knitted him to you forever, at least in loyalty.

BIRD Recommends



The JONSSON SCREEN

(PATENTED)

As a

KNOTTER

BULL SCREEN

COARSE SCREEN

FINE SCREEN

TAILINGS SCREEN

Looks are sometimes deceiving. At first glance you'd never realize what a whale of a job this simple, sturdy, compact Screen is capable of doing.

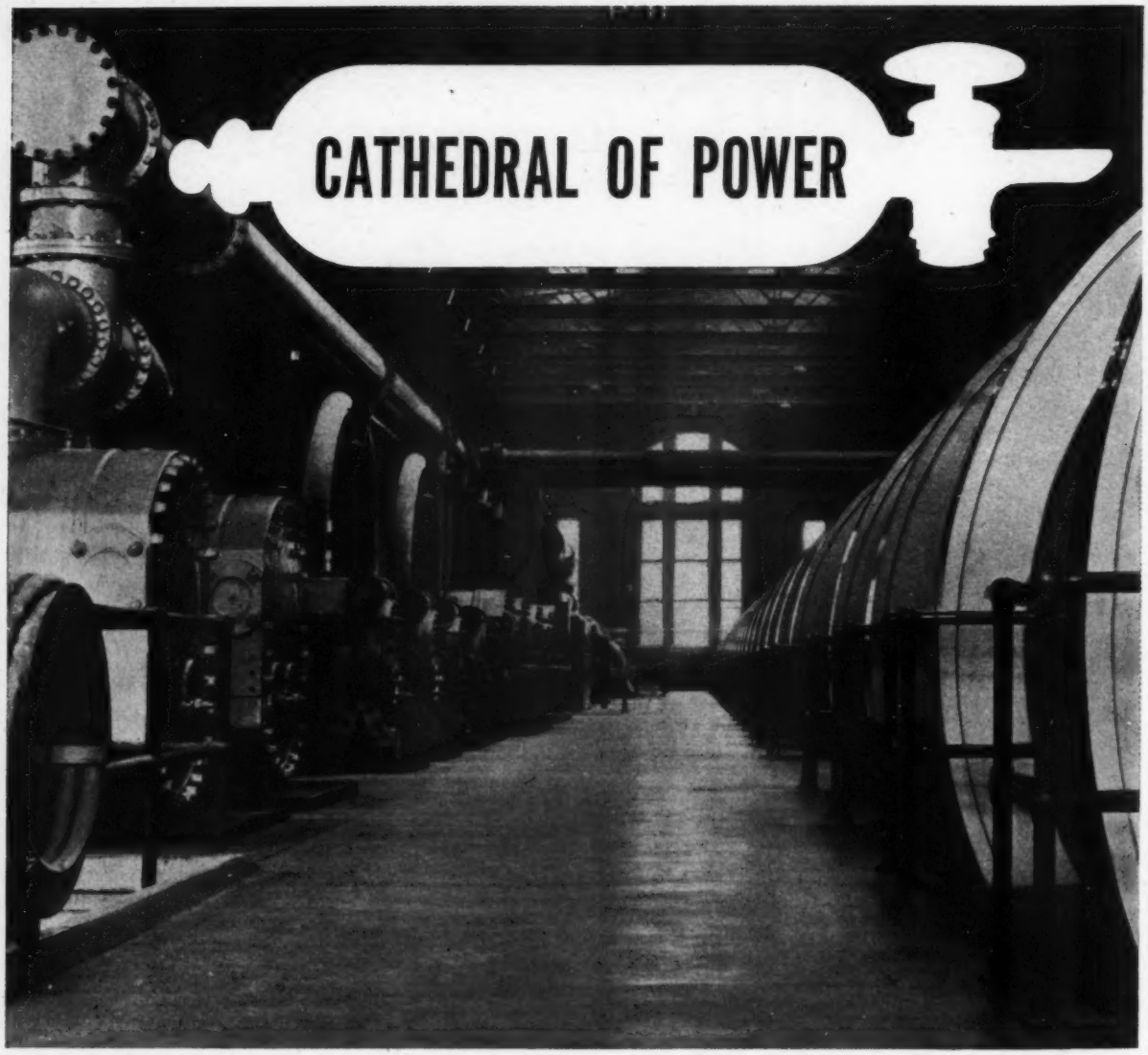
It turns out clean pulp and lots of it with the very minimum of fibre loss in the tailings.

It's easy to install and has great flexibility. Screening action and capacity may be precisely controlled. Consistencies up to 1% are readily handled.

Now is the time to find out what the Jonsson Screen can do for you. Get in touch with

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS



• *Compressor room, North Plant, Wyandotte Chemicals Corporation, Wyandotte, Michigan. Heart of the processing operations, source of power, gas and air compression, vacuum, and pumping requirements of the North Plant, its shops and salt wells. Here originates power used to transform salt, limestone and coal into alkalies and chemicals.*

WYANDOTTE CHEMICALS CORPORATION

ONE OF THE WORLD'S GREAT PRODUCERS OF CHEMICALS

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VITAL TO VICTORY TODAY—READY TO WORK FOR A GREATER TOMORROW

THE WRIGHT WAY IS THE *Right* WAY!

● Every hoist and every trolley and every crane in the **WRIGHT** line is designed and built to meet three basic principles: Safety—Efficiency and Economy. Safety first, of course, to both men and machine. Efficiency of operation from first to last. Economy stems from the rugged durability of **WRIGHT** equipment which makes for extremely low maintenance costs.

See your local **WRIGHT** distributor. You'll find him listed in your metropolitan classified telephone book. If your problem is special, ask your distributor to call a **WRIGHT** engineer, who has had years of experience in solving material-handling problems.

ARMY E NAVY
FLYING OVER THE WRIGHT HOIST PLANT

ACCO

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WRIGHT MANUFACTURING DIVISION
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TRADE MARK

In Business for Your Safety

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 5 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS

Map Copyright by L. D. Post, Inc., New York. American Map Co., N. Y.

HIGH LIGHTS: Connecticut's first paper mill was built in Norwich, by Christopher Leffingwell, in 1767. He manufactured by hand about 1,300 reams per year and employed possibly a dozen men.

From this small beginning, Connecticut has developed an important papermaking industry, ranking 18th in the production of paper and paperboard. With the transformations from rag stock to wood pulp her manufacturers have made readjustments, tending toward specialties ranging from thin tissues to thick boards and papers of high dielectric properties, and also of phenolic resin content.

Connecticut is also famous for the building of the first American Fourdrinier machine in the year 1829, in the shops of Phelps and Spafford at South Windham. Here, their successors, the Smith & Winchester Manufacturing Company, continue the building of paper mill equipment.

Connecticut has 12 Fourdriniers, 16 cylinder machines, 18 wet machines and 3 Yankees. The major portion of the State's production is a variety of paperboards.

Draper Felts for Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

Canton, Massachusetts

RALPH E. BRIGGS Sales Manager

BRADFORD WEST PITTSFIELD, MASS. • WILLIAM N. CONNOR Jr CANTON, MASS. • L. H. BREYFOGLE KALAMAZOO, MICH. • CHAS. E. BERTSCHY MILWAUKEE, WIS. • W. L. CAMPBELL SAVANNAH, GA. • BALFOUR GUTHRIE & CO. Ltd. PACIFIC COAST

G
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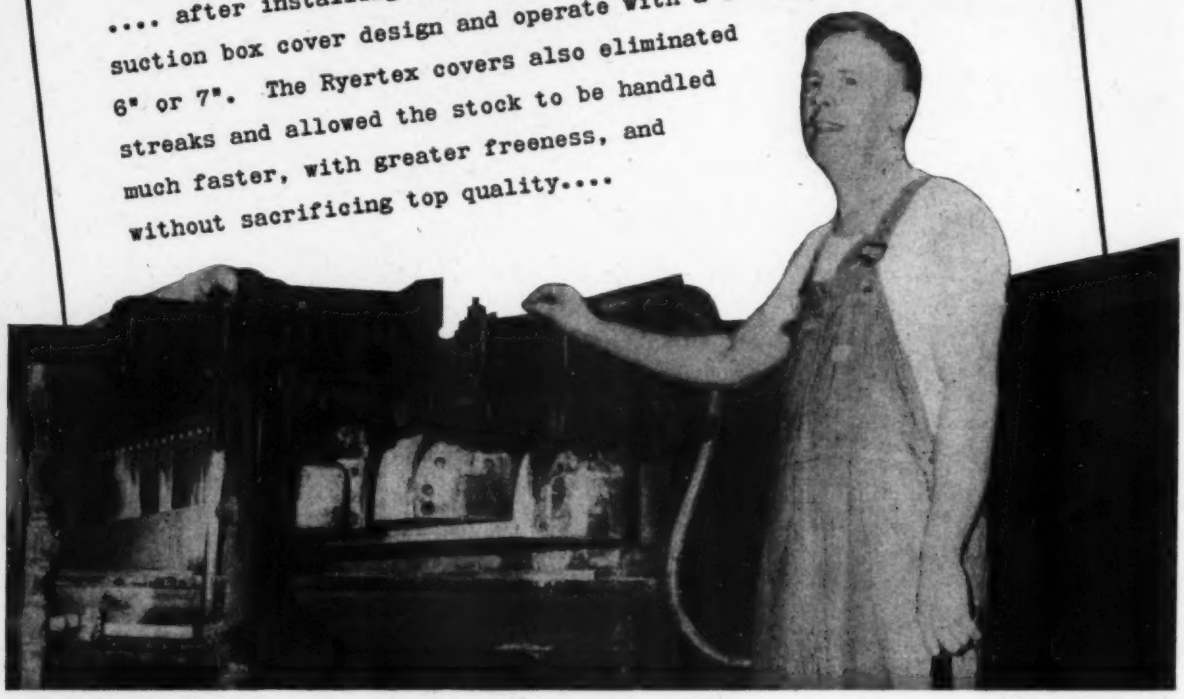
For the Paper Industry

Cotton Rolls	Glassine Supercalenders
Interleaved Rolls	Web Supercalenders
Paper Rolls	Friction Calenders
Embossing Rolls	Embossing Calenders
Chilled Iron Rolls	Laboratory Calenders
Sheet Calenders	Rag and Stock Cutters

Mullen Testers

SUCTION BOX COVER REPORT

.... after installing Ryertex, this plant was able to change the suction box cover design and operate with a 5" vacuum instead of 6" or 7". The Ryertex covers also eliminated streaks and allowed the stock to be handled much faster, with greater freeness, and without sacrificing top quality....



Increase Production with Ryertex

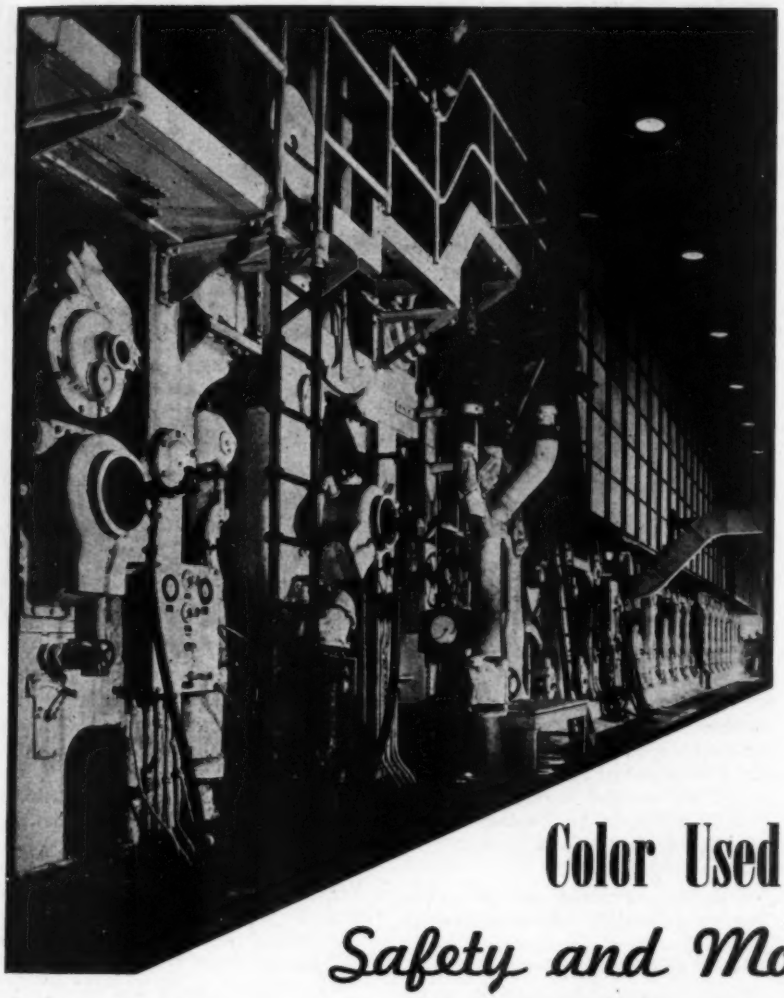
Less vacuum — No streaks — Greater freeness

The reported facts on Ryertex performance can be readily translated in terms of (1) Increased production, without a corresponding increase in wear, or power costs; (2) Reduction in vacuum, which lengthens the life of both wires and cover; (3) Quality of stock is more easily maintained through greater freeness in handling.

We urge you to investigate the advantages of Ryertex suction box covers, and other Ryertex bearing applications as well. The cooperation of Ryertex engineers is assured at all times. These men will be glad to help you overcome bearing problems and make practical suggestions for Ryertex application. Send for helpful, informative bulletin.

JOSEPH T. RYERSON & SON, INC., CHICAGO, NEW YORK

RYERTEX BEARINGS



Press section and dryers of paper machine after painting—high visibility of machine parts

Color Used in Paper Mill . .

Safety and Morale Improve

C. L. LYON
Plant Personnel Manager
Scott Paper Company

▸▸▸ A MARINE, a former employee who had been gone for more than three years, dropped in to see us recently. He wore the Purple Heart, and well over the quota of military decorations. Before we had a chance to ask him about himself, he wanted to know what we had done to make the place so bright and cheerful. He commented on the changed appearance of the plant—thought the new colors had "pepped up the place a lot."

His remarks were typical of those made by those who see the plant for the first time. Visitors from other companies are particularly impressed, and as time is being written, the general secretary of the Chester (Pa.) Y.M.C.A. is inspecting our plant with the thought that the same color scheme might be adaptable to the "Y."

Considerable publicity has been given recently to the use of colors, other than the old fashioned drab black or gray and white, in factories. Some really valuable data has been gathered through the scientific study of the effects of various colors upon such diverse factors as production, safety, good housekeeping, employee morale, turnover, absenteeism, eyestrain, health, in fact, almost every conceivable phase of factory life. Most of the tests, however, have been conducted by paint manufacturers, consequently, may be somewhat on the optimistic side. Nevertheless, our experience has indicated that much can be gained through the use of a color scheme which is adapted to the manufacturing process and which adheres to the tenets of good lighting (reflection) and which has a pleasing psychological effect.

Before describing our color scheme or claiming any particular benefits from it, it should be stated immediately that we have made no attempt to evaluate scientifically the gains which accrued to us through its use. There are several reasons why such a study has not been desirable or even possible. First of all we did not deem it advisable to set up a control unit—that is, to leave one unit painted in the conventional manner so as to measure performance there as opposed to the performances on the newly painted units. Second, in wartime, conditions change so rapidly in an organization such as ours that no test would be conclusive due to the dynamic nature of the people and the processes involved.

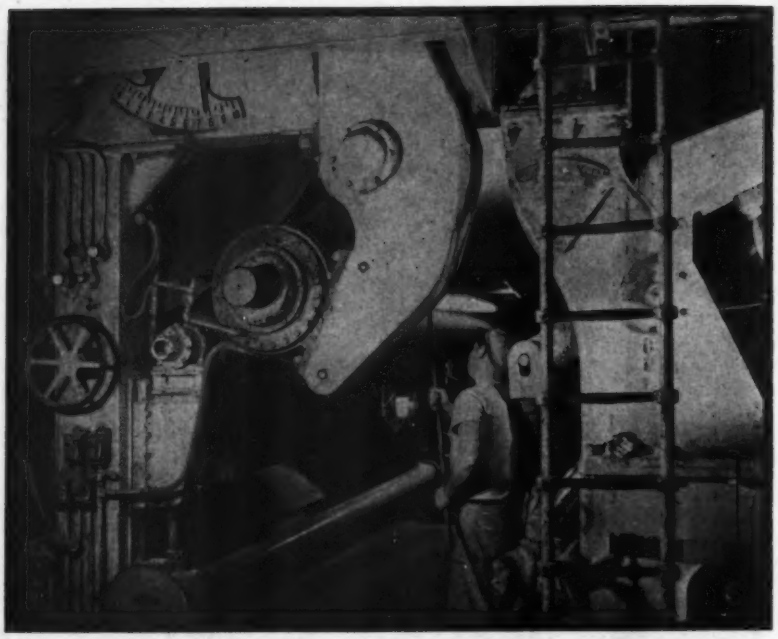
When our painting scheme was installed, the demands of selective service threw our entire personnel into a state of excitement or restlessness which is the natural accompaniment of a war period. Another contributing factor was that several management changes of far-reaching consequence were made during this period. Further changes were the use of music, the introduction of formal absenteeism control, turnover, and safety programs, and many other devices designed to improve our working conditions. When so many changes of

such widely divergent natures are made it is well nigh impossible to say that any one thing is wholly responsible for decreased turnover or increased production or any other of the numerous gains which occurred in our organization during this period. The best we can hope to do is to point out that such and such an improvement took place and possibly our new color scheme influenced it. In certain instances, we are quite sure, the new colors deserve all/or most of the credit for certain improvements.

No one can doubt that a repaint job, no matter what colors are used, immediately brightens a place. This is equally true of the home, the office, or the factory. It also engenders within everyone—at least until the newness has worn off—the wish to keep it that way as long as possible. If, in addition to making a place clean and bright by repainting, you can also make it cheerful, optically correct, and psychologically satisfactory, you have made a real contribution toward the well-being of your people.

It has been our experience that since we repainted our plant the general housekeeping has been better than ever before in the history of the company. People seem to take more pride in maintaining order in their work places. But here again we cannot say that the new paint job was wholly responsible for the changed attitude of our people toward the problem of good housekeeping, since almost coincidental with the installation of our color scheme, a Plant Inspection Committee was formed. This committee makes periodic inspections of the whole physical plant and then reports back to the Supervisory Safety Committee and the department heads on housekeeping conditions. Such action is in itself a very powerful stimulus to orderliness and cleanliness. But it is more than probable that without the bright new colors we would not have been able to accomplish nearly as much as we did.

Our safety record also improved tremendously about the same time. It is entirely feasible to assume that improved visibility and more cheerful surroundings played a very important part in the reduction of our frequency rate—a reduction of about 87 per per cent in the past two years. Once again, however, there is an outside influence at work which makes it impossible to measure the part played by paint in achieving our safety record. A new safety engineer was appointed and the whole safety program was given a thorough overhauling at about the same time. So once again we have multiple factors present and, consequently, we cannot say that our color scheme caused a decrease of such and such a percentage in our accident rate. We do feel certain, however, that it did make an important contribution to the over-all picture.



Under side of Yankee dryer. Visibility increased by painting

Thus it goes—

Our place is cleaner and the people seem to enjoy their surroundings more than before (but we also have music playing about one-half of the time).

Our absentee and turnover rates have improved (but specific programs designed to improve them have been installed).

There are fewer complaints of eyestrain (but our lighting system was improved).

The plant itself is a more comfortable place, physically, to work (but several heating and ventilating changes have been made).

To summarize as briefly as possible:

We have noted many of the gains which the paint manufacturers claim result from the use of a psychologically sound, pleasantly cheerful and optically correct color scheme. There can be little doubt that the color scheme accentuated or at the very least accelerated our improvements and at the best is responsible for many of them. As we pointed out before, we can only offer an empiric judgment of the value of any color scheme, but our attitude toward it is best described by the fact that after several years, during which the plant has been repainted several times, we still adhere closely to the original design.

▶▶▶ NOW TO DESCRIBE OUR COLOR SCHEME. For the lower part of the walls or dado we use a gray-green, for the upper part a yellowish cream, and for the ceilings a semi-gloss white. The machinery is painted a yellow-green, the working parts are buff and the danger area is red. It probably would be well, however, to paint the danger areas orange and reserve the use of red for fire equipment.

Our color scheme was devised by A. A. Brainerd, of the Philadelphia Electric Company, Philadelphia (Pa.), in conjunction with color engineers of the E. I. du Pont de Nemours & Company, Wilmington, Delaware. Measurements made by Mr. Brainerd show that without the use of any additional electricity or any additional lighting equipment, the actual light output upon the completion of our paint job was increased 15 per cent. This alone, as anyone who is at all familiar with lighting costs can testify, is a very spectacular gain and one which of itself might well be worth all of the trouble and the cost of installing these new colors. As a matter of fact the cost factor should be disregarded because whether or not "three dimensional" colors are used, plants still must be repainted and the cost, therefore, is constant.

No doubt the substitution of pastel shades for the conventional black or grays and whites, might at first seem to be a startling innovation. It certainly was a great change for us. Our plant was shut down for two weeks

for general repairs several years ago and during this period it was entirely repainted. Upon the return of our people, most of whom were given their vacations at this time, we were agreeably surprised to find that the new color scheme had received almost instantaneous acceptance. It has been found by lighting engineers that the ideal reflection factor is 5,500 angstrom units. The visible spectrum runs from 4,000 in the blue or purple area to 7,000 angstrom units in the red areas. The spotlight green which is used predominantly in painting our machinery has a reflective value of 5,480 angstrom units which places this color in the nearly perfect range. All of the colors used have an almost identical value. This particular scheme of painting utilizes hues instead of shades for contrast.

In other words different colors with the same reflective factors are used instead of using various degrees of reflectivity as is the case in most industrial plants today. This condition does not lend itself to good visibility and is perhaps best illustrated by the well known story of the president of the shoe factory in Rockland, Mass., who stopped beside a machine operated by a middle-aged man. The man complained to the president that he had been having headaches and blind spots. The president looked at the machine and saw that the operator was working on a black shoe at a black machine and the line of demarkation was hard to distinguish. He suggested to the operator that he go to the paint shop, get some paint and paint his machine any color he saw fit. The man did as was suggested and his headaches and blind spots stopped almost immediately. As a result of this all the equipment in the factory was repainted—the production rate increased, the accident rate decreased and there were far fewer complaints of eye strain. This simple but practical experience illustrates in a rather startling manner immediate gains which can result throughout the proper use of hues.

Quoting from a paper which was presented before the 35th Annual Convention of the Illuminating Engineering Society at Atlanta, Georgia, September 22-25, 1941, Mr. Brainerd has this to say: "In the average factory we have a more or less white ceiling, and all too often the walls are also white, even down to the floor. Machines are most frequently green, deep gray, or black, affording almost no color or brightness contrast to the material under fabrication. In such surroundings, piling on high-lever lighting does not produce the expected improvement in seeing. It is a great example of camouflage."

The color which is used in any factory should, of course, be one which offers a definite contrast to the material under fabrication. Consequently, the color scheme which is at present in force in the Scott Paper Company would not be universally acceptable or desirable. It seems quite feasible that in choosing colors to be used in your factory you should take into account the particular color of the materials with which you work most frequently and then choose a contrasting color which falls within the proper reflective range. Most lighting engineers should be able to tell you or at least determine for you the reflective values of various colors which you may have under consideration. As was stated before, the best results would be obtained when working in the region of the greatest eye sensitivity. Colors of low chrome (weak colors) are more comfortable on surfaces continuously in the line of vision.*

Little attention has been given so far to the use of colors on the floor. In most instances it has been considered adequate to install a cement, brick or wooden floor and then to ignore the whole matter. Recent experiments have indicated that there are very large gains to be made through the use of painted or colored floors.

In the past year, at Scott Paper Company we have painted the floors in several of our working areas a rather light shade of brown. The areas so painted have immediately become brighter and more pleasant places to work. Frankly, our experience has been quite limited in respect to the used of colored floors but from what we have done so far I believe that shortly we will utilize them much more fully than we have in the past. By painting the floors you not only achieve greater lighting and better seeing but you also give an added incentive for better housekeeping because any dust, dirt, or misplaced articles show up immediately. The particular areas which have been painted have remained in a better condition housekeepingwise than adjacent unpainted areas. Furthermore, a painted concrete floor such as ours can be swept more easily than areas which have not been painted and, consequently, the cleaning problem will be materially reduced.

The paper machines themselves have been painted spotlight green. This eliminated the use of a deep red which was formerly used and immediately brightened the place quite a bit. The dryer heads themselves were also painted spotlight green. The various valves and levers were painted a spotlight buff which immediately gave greater visibility through a contrast to the working parts of the machine. The danger points and all exposed moving parts were painted red. Production-wise, safety-wise, and main-

(Concluded on page 214)

(*) *Salvaging Waste Light for Victory*, by A. A. Brainerd and R. A. Massey.

Folded towel machine being painted during a vacation shutdown for repairs

An Early Glance at Foreign Markets

By the Staff
THE RESEARCH INSTITUTE OF AMERICA

▶▶▶ BEGINNING NOW and continuing for some years after the end of the present war, the flow of international trade will be governed by physical needs. For foreign trade, this is not normal. It results from distress; from abnormal, emergency conditions in the four corners of the world. Crippled industries, devastated cities, ruined transports and communications systems have to be rebuilt as do countless roads, homes, mills, factories. Food, clothing, medicines, and fuel will have to be supplied to millions. The Western Hemisphere will supply all of these needs—the United States, most of them. It does not appear that this basic situation can be altered by any theory of business or government, no matter how strongly supported, or by the triumph of one economic or political policy over another, no matter how complete. Goods will flow here to everywhere, and Uncle Sam will become history's largest creditor.

Foreign countries engaged in the war virtually have exhausted their supply of dollars. Until they are again able to send goods, we shall have to take their paper. This will be made possible through public and private loans, credit agreements between governments in which it is expected that private capital will be permitted to participate. Legislation restricting this type of investment (the Johnson Act) is coming up for modification or repeal. It is likely that some government guaranty arrangement will be adopted which will remove elements of risk but which also will limit the income to be derived from the extension of credit abroad. In any event, from the point of view of the producer and seller here, there will be money to pay for goods. The question "Where will they get the money to pay for all this?" should not be permitted to cast doubt upon the basic fact that the goods for postwar reconstruction will come from our producers. Just how the financing of the distress period will come or what forms it will take, are matters of special interest to bankers and investors. Suppliers will be satisfied with the assurance that in fact it will be accomplished. The certainty that money or credit will be made available is as final as anything beyond tomorrow can be. It is made so by the compelling arguments of suffering, social and political unrest and instability which prolonged poverty and unemployment would bring to Europe—to say nothing of our own interest in creating healthy markets.

With shipping space critical and likely to be scanty for some time; with supplies of American goods restricted; with supplies of foreign exchange limited, no foreign government with hungry, sick, ill-clad and ill-housed population is going to be in the market for our luxury goods in the immediate postwar period. The political tenure of most foreign governments will depend largely on their ability to satisfy the urgent demands of their people. This means that "normal" business is a long way off. It means that imports will be programmed—rigidly controlled by buying countries. It means that import licenses will continue long after the relaxation of U. S. formalities. It means that bulk purchasing by foreign government purchasing missions will be extended and expended—certaintly not abandoned.

Expect European imports to be scheduled in the following order:

1) Relief goods: Food, fueel, clothing, medical supplies.

2) Reconstruction goods: transport equipment of all kinds, railroad locomotives, cars repair and replacement parts, rail ties, signalling equipment, etc.; communications equipment, telephone, telegraph, power generating and transmission equipment, ships; housing and general construction supplies and equipment, electrical supplies, hardware, farm machinery.

3) Industrial equipment: machinery, machine tools, hand tools; raw materials of all kinds.

During the distress period American sellers will not have to go abroad. Europe will come here—is here now. Sellers should make themselves and their products known to the foreign purchasing missions in Washington and New York, to purchasers for UNRRA and for private relief agencies.

Foreign Purchasing Missions

Foreign governments have for some time maintained buying missions in the United States. However, it is only recently that they have expanded their programs to include not only colonies, but the purchase and stockpiling of supplies for continental Europe. There is nothing to lose and everything to gain in working through the Foreign Purchasing Missions now. Even if manufacturers never intend to expand their activities into export trade, the Missions still make good customers. And if they do have an eye on an expanded postwar export business, the Missions offer a valuable opportunity to get the manufacturers' goods into the foreign market and to start building overseas demand for them.

Dealing with foreign government purchasing missions is very much like dealing with procurement agencies of the U. S. government. More often than not competitive bids will be requested. Red tape, complicated formalities, numerous documents are all to be expected as routine. On the other hand, terms are usually cash, in dollars, sometimes in advance. Delivery requirements are usually reasonable and shipping details are handled by the purchasing mission.

Government Controls

Businessmen both here and abroad are impatient for the time when government agencies can be by-passed and person-to-person, firm-to-firm relations can be resumed on a "business" basis. But government agencies will be in the picture for as long a period as you can safely cover in your production and distribution planning.

As long as we have supply shortages, exports will be cleared with WPB. As long as there are shortages of shipping space, exports will be cleared with WSA. As long as foreign countries must limit their imports, they will control them. As long as the war goes on, FEA will want to supervise exports from the point of view of possible advantage to the enemy.

EDITOR'S NOTE: A general, over-all picture of the foreign markets situation is presented in this article. Although there is no specific reference to the markets as related to the pulp and paper industry, a very important domestic market in paper and paper products is revealed. This market will be required to package the numerous other products that unquestionably will be shipped abroad. . . . Now is the time for the paper industry to look into the requirements of this export market, also to give consideration to the possible expansion of the export trade of the industry itself.

Until recently, the government was considering a cut in the number of products subject to export quotas and licenses. Of the 1,000 on the list, about 800 were to be freed of regulation. Control was to be retained on only a few—such as forest products, chemicals, textiles and some consumer goods. This policy was designed to give American exporters a fast re-entry into world markets. But now that most domestic controls (such as L and M orders) are almost sure to continue beyond V-E Day, it is highly unlikely that any large number of export controls will be lifted.

Loosening of Restrictions

Earliest relaxation of controls will affect shipments in the direction of Latin America. The internal economies of Western Hemisphere countries have been less drastically affected by the war and they have been able to accumulate considerable dollar credits.

It is also expected that restrictions on commercial transactions and communications—as including civilian air travel over the Atlantic—will be relaxed early in 1943 to permit the resumption of private trading with France. The Treasury will release funds for that purpose. The Treasury will also help manufacturers get a private passport to France right now if their application is accompanied by a French request. The French Embassy will make such a request for the manufacturer if his visit to France will help re-establish important export industries there.

It is important to keep in close touch with foreign buying missions and the activities of the FEA. At present, these are the most effective means of projecting your business overseas. Despite the FEA policy that applications from private exporters will be treated on an equal basis with those from foreign government buying missions, it is still wise to get export licenses through foreign government missions wherever possible. Their statements as to the end use that will be made of the goods carry authority; and they are in a favorable position to get State Department intervention for special consideration of applications.

Help in Reaching Foreign Markets

Today the manufacturer can't show this line to foreign prospects who are eager and waiting to buy. But the door to overseas trade may be opened for you by the United States Commercial Company—an agency of the Foreign Economic Administration. One of its main jobs is to put American and foreign companies in touch with each other. The agency maintains overseas offices to which foreign business men bring their inquiries concerning American products. The U.S.C.C. answers these inquiries from its library of catalogues, supplied by the United States companies.

The manufacturer can send a description of his line to the U.S.C.C. It is anxious to build as complete a library as possible. It will "showcase" the line to potential foreign customers whenever an opportunity presents itself. The address is U.S. Commercial Company, Mail Division Pouch, Department of State, Washington, D. C., marked for any or all of the cities mentioned below.

Nature of the Demand

At the moment, foreign inquiries coming into U.S.C.C. offices are running most heavily to producer's machinery and equipment, machine tools, hand tools, textile machinery, mining machinery, transportation equipment, printing machinery, chemicals machinery, electrical machinery, automotive equipment, etc. Manufacturers should send their catalogues along even if their products do not fall driectly under the categories mentioned, and even if they are not now able to fill orders from abroad. Important postwar sales opportunities may show up.

At the present time this service is limited to the Middle East where the U.S.C.C. has established offices in Alexandria, Bagdad, Beirut, Cairo, Damascus, Jerusalem, Jidda, and Teheran. Spokesmen for exporters of transport machinery and automotive equipment are making a good case for increased export quotas to this area on the ground that transportation limitations are on a real deterrant to development of all commerce and agriculture.

The extension of this service or a similar service to other areas is a good possibility. It would be directly in line with the Administration's policy of expanding foreign trade after the war.

Anyone who has specific questions about the possibility of buying or selling certain types of goods from abroad, can write to the FEA or the Bureau of Foreign and Domestic Commerce, Washington, D. C.

Sales Inquiries

Many businessmen who have never had any export experience are uncertain how to treat inquiries from would-be foreign purchasers. Demand for American goods has been stimulated by actual sampling of them abroad in places where they were never seen before Lend-Lease and our armies introduced them. The chewing gum and soft-drink habits have taken firm hold in unexpected places and there is no reason to believe that other items will not make similar impressions.

It is important not to ignore foreign inquiries. They should be treated exactly like business leads from a nearby state. The very fact that a manufacturer has received an inquiry is sufficient proof of the existence of a market for his goods. He needn't be frightened by foreign languages. And should not worry about the complexities of export controls and rationing of shipping space. In today's seller's market, these problems are often taken off his hands.

Much of export business is done on a cash-on-the-barrel basis. Foreign customers, anxious to obtain American merchandise, are willing to draw letters of credit in connection with orders f.o.b. mill or factory or warehouse receipts—or even, in some cases, against certificate of completion. This is equivalent to domestic cash business. The foreign purchaser worries about shipment and formalities which are handled by his bank or agent here.

Under normal peacetime conditions the manufacturer might be compelled to give more service to foreign customers who are, generally, dissatisfied with the comparatively harsh, cold terms proposed by most American exporters. But the actual situation today, involving problems of supply, storage, shipping and government regulations, justifies the manufacturer's insistence on terms which end his responsibilities at his factory or warehouse.

▶▶▶ Information is now available on foreign markets in the following countries:

The Netherlands

The Netherlands have been forced to take on one job they did not expect: a subsistence relief program for the population of a country which previously always enjoyed a high standard of living. At the same time, the Netherlands must continue preparations for re-entry into world trade.

Prewar Netherlands economy included the production of high-grade agricultural items, some of the world's finest dairy products. High-grade seeds for cauliflower, spinach, cabbage and similar vegetables have been raised in the country for generations past, as well as bulbs and seeds for flowers. But a large part, perhaps half of the dairy production area has been flooded and that land will be necessarily idle for four years or more.

This means new and more dredging and pumping apparatus. Whether such facilities will be purchased here or

taken from Germany as partial indemnification has not yet been decided.

The great question continues to be: Will the Netherlands regain even partially its historical trade leadership? Item one is the importance of the Amsterdam Bourse as an indicator of the position of European industry. A large part of the answer depends on how soon the German scrambling of business ownership is cleared up. The recovery of the East Indian empire will also be a "must" for the full vitality of Amsterdam.

Dutch ships, constituting one of the great maritime fleets of the world, will not be able to go into action when the European war ends; the fleet will not even be free to do much in the way of transporting reconstruction goods to the Netherlands homeland. Until the Dutch East Indian empire is reconquered, the major portion of the merchant fleet will be devoted to the Pacific war.

Of the 2,900,000 tons of Dutch merchant shipping, almost two and one-half million remains intact. However, there has been little replacement of the more than a million tons that have been sunk. This loss will mean a considerable new ship program for the Netherlands after the war.

The great diamond industry must also be rebuilt. Skilled cutters now operating in New York, London and Palestine will, in some instances, not return to the old center. However, early efforts will be made to get the cutters back to their former locations. Already reported is a shipment of industrial diamonds to Belgian centers for the purpose of recovering the trade.

Ireland

Irish markets may provide the earliest opportunity for selling overseas. Ireland not only has established a state-owned merchant shipping trade during the war, but her civilian airport is the busiest in Europe today. In addition, her expansion programs for both shipping and air traffic make her a good potential market for air-craft, airport facilities, ships, marine production and outfitting items. Her post-war housing programs will need construction and engineering equipment.

Ireland's credit position is favorable, if only as a result of the large trade she has carried on during the war. The Post-War Commission of Erie is now at work on a survey of future Irish-American trade.

Belgium

Belgium, the most densely populated country in Europe, has always been an extensive manufacturing country short on natural resources. Normally in need of raw materials, she will require even more to get back to peacetime production. In addition, Belgium will need many manufactured products, principally: Locomotives, thread, timber props for mines, food, clothing, and machinery of various kinds.

Belgium should be a sound credit risk. She holds a large reserve of gold in this country which she plans to retain as bedrock for a conservative credit foundation for the future.

All purchasing in the United States for the Belgian Government for relief and rehabilitation purposes is done by the Commercial Counselor of the Embassy, through offices in Washington at 101 Leroy Place, N. W. Wherever possible, Belgian policy will be to foster purchase of all other Belgian requirements through normal trade channels without intervention of the government. The New York office at 630 Fifth Avenue is concerned with prompting these trade connections between private business in the home country and in the United States.

Swedish Markets

Sweden, like many other neutrals, has accumulated large amounts of gold and foreign exchange during the war. Her need for many types of goods is enormous. Application of Pan-American Airways for certification to route five flights weekly from America to Stockholm highlights the advisability of establishing Swedish commercial relations early.

The Swedish standard of living is the only other in the world as high as that in the United States. Swedish incomes permit the purchase of many American items which would be regarded as luxuries in nearly all other Europeans countries.

1) *Housing*—Sweden is planning a housing program of 45,000 dwellings per year to last three to five years. In connection with this construction there is a market for equipment machinery, especially such types as bull-dozers and excavators. For housing construction itself, piping is especially needed.

2) *Clothes*—The war has seen some development in the Swedish manufacture of ready-made clothing—especially for women and children—but Sweden's demands are far from satisfied in this field. The country is a particularly good market for sales of misses' and children's wear. The variety of styles which the American clothing manufacturer can offer will be an added inducement in the Swedish market.

3) *Appliances*—American electric appliances, especially washing machines, ironers, food mixers, toasters, may all find ready markets if American companies act quickly.

4) *Port facilities*—The Swedes are making plans for development of Gothenburg as a port. This may be partially due to the destruction of Hamburg, which leaves a large part of North Europe without port facilities.

5) *Roads*—Another item that has not been sold to Sweden in the past, but should find ready sale among Swedish municipalities, is the automotive snow plow for road clearance.

6) *Aviation*—Preparatory work is already under way for the construction of a transatlantic airport in Stockholm. Swedish aviation has already contracted for the purchase of ten large Douglas planes to be used in its European traffic and also in traffic with America.

7) *Radio*—Sweden will need both radio and radar equipment.

8) *Miscellaneous* — Sweden also needs varying quantities of the following items: coal and coke, petroleum products, asphalt, ship plates and sheet steel, aluminum and magnesium, copper profiles and wire, automobiles and tractors and their parts, electronic equipment, fertilizer, soda, pigments of all kinds, boric acid and borax, vegetable oils, glycerine, vitamins, synthetic resins for plastic molding, rubber tires and belting, asbestos and brake lining, cotton and rayon yarns including tire cord, raw cotton and wool, solvents for the paint industry, touol, bensol and phenol, canned and dried fruits.

In selling to the Swedish markets it is now possible not only to transact business through the Purchasing Mission, but also to negotiate with private Swedish firms through private channels. All inquiries as to trade possibilities with Sweden may be directed to Swedish-American Chamber of Commerce, 630 Fifth Avenue, New York. Inquiries will be forwarded to the proper party.

Not only is Sweden a ripe seller's market, but it offers many buying opportunities. Swedish inventions may be licensed for manufacture in this country. This practice has already been in operation in the case of Electrolux refrigeration, ball bearings, gauge blocks and various electrical equipment. Two outstanding opportunities now available for licenses are an arsenic treatment of lumber which makes it weather resistant and new butter manufacturing process which eliminates the cream stage. Sweden plans to send to this country a traveling exhibition of its quality products

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Economy in 4160 Volts for Medium-Sized Plants

D. L. BEEMAN, Engineer
Industrial Engineering Division
General Electric Company

▶▶▶ WHICH IS THE MORE economical basic distribution voltage for a new, medium-size industrial plant, or an existing plant being reconverted, modernized, or expanded: 2400 or 4160 volts?

Many operators will say 2400 volts, and for an apparently logical reason. A sizable percentage of the total electric power in many industrial plants is consumed by motors ranging from 40 to 500 horsepower. Since motors in that range can be connected directly to 2400-volt circuits, it is commonly believed that the lowest-cost electrical system—including power generation, distribution, and motors and control—can be obtained by distributing purchased or generated power at 2400 volts. A review of the factors which influence system cost indicates that such is not the case.

Advantages of 4160 Volts

Studies of specific systems show that, so far as over-all electrical system costs are concerned, it is nearly always less expensive, to use 4160 volts primary or generation voltage rather than 2400 volts, and to operate most motors of 200 hp. and less on 460- or 575-volt circuits. This conclusion is based on the data shown in Figure 1. The derivation of these curves is explained in detail later in this article.

The 4160-volt system offers many important advantages other than lower cost. Short-circuit current bottlenecks are not reached as readily as higher system short-circuit k-va. can be tolerated in 4160-volt systems, compared with the 2400-volt systems, before it is necessary to introduce reactors or to resort to special combinations to reduce short-circuit currents. In general, fewer primary feeder positions and less cable are required for the 4160-volt distribution system compared with one using 2400 volts. This reduces the space required for housing the switchgear, and also the space required for conduits for the primary cable.

From the standpoint of safety, it is generally concluded that there is substantially no difference between the commonly used 2400-volt delta system, which normally is not grounded, and the 4160-volt system with the neutral grounded according to modern recommended practice.

To select the most desirable primary or generation voltage would necessitate comparing all voltages below 15 kv. This would be rather involved, and is beyond the scope of this article. The main consideration in many medium-size industrial plants is whether to use a 2400- or a 4160-volt primary power system. The remainder of this discussion is limited to an economic comparison of these two voltages.

In some areas 4800 volts is the standard primary voltage. The basic factors presented here are not substantially altered whether the voltage is 4160 or 4800 volts. Since 4160 volts is far more common than 4800 volts, the former will be used as a basis of comparison.

In studying the economics of this problem, certain basic equipment and system elements were considered. These are discussed in the following paragraphs, with an inclusion to show the effect of other types of motors and motor starters than those listed below.

Motors and Motor Starters

Standard Squirrel-cage Induction Motors Used as a Basis of Comparison—Standard squirrel-cage induction motors are by far the most common. Therefore, to make this study as representative as possible, these motors have been considered as a basis of comparison. The curves in Figure 1 are plotted for 1800-rpm motors.

High Interrupting Rating Motor Starters Considered in This Study—There has been a tendency to totally disregard short-circuit current interrupting duty imposed on motor starters for short circuits which may occur on the load side of the motor starter. Adequate interrupting capacity is desirable in the motor starters to safely and quickly open these short-circuit currents. When a fault occurs on the load side of the motor starter and the latter does not have adequate interrupting capacity, it may fail and endanger nearby personnel and property. It may also cause the feeder circuit breaker to be tripped out, thus dropping service over a large area of the plant and, as a consequence, substantially affecting production. From this it can be seen that it is equally as important to select motor starters with adequate short-circuit interrupting rating as it is to select feeder circuit breakers with adequate interrupting rating. Therefore, only modern combination motor starters, such as illustrated in Figures 2 and 3, are considered in this basic comparison.

System Factors

To use 440- or 550-volt motors in a plant in which the primary or generation voltage is higher than 600 volts requires a transformation to less than 600 volts for these motors. Therefore, when comparing 440-volt motors to motors operating directly at primary voltage (i.e., 2400 or 4160 volts), the installed price of a step-down substation must be included with the 440-volt motors and control. This substation is included at $4.00 per horsepower. This figure is based on

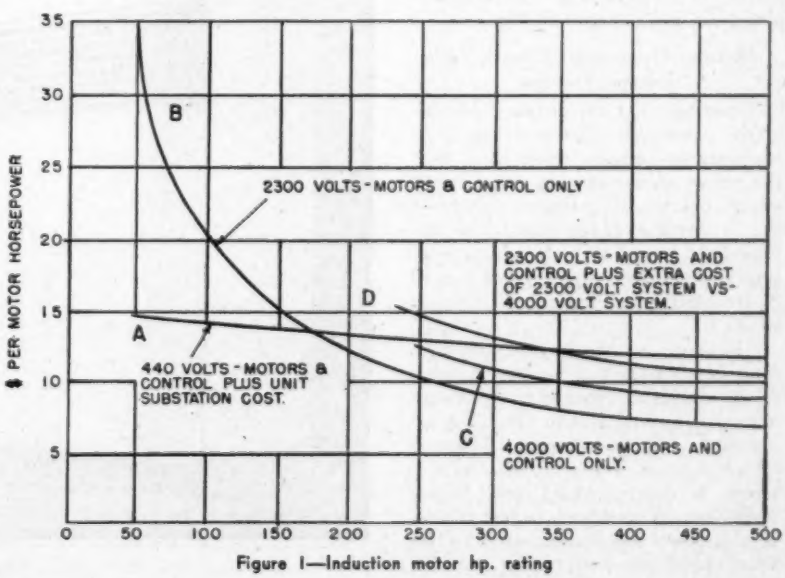


Figure 1—Induction motor hp. rating

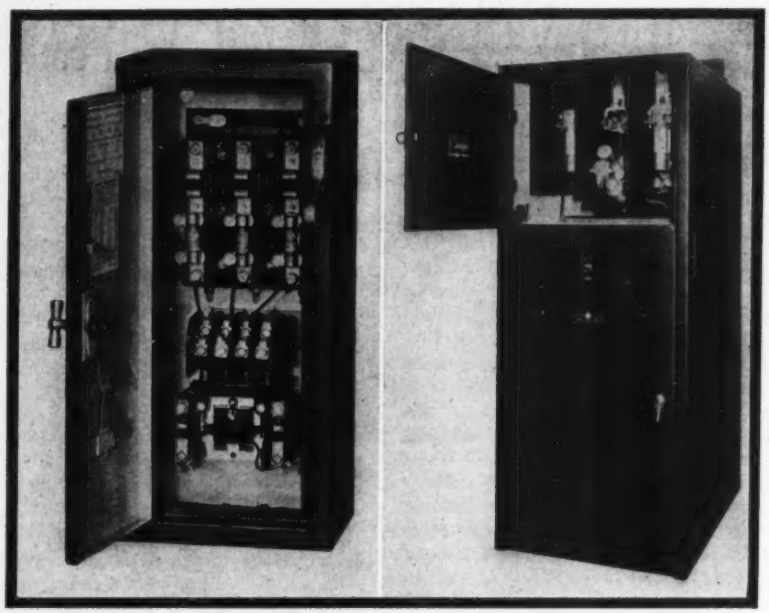


Figure 2 (left), Figure 3 (right)

the installed price of a unit substation such as shown in Figure 4, consisting of a transformer and one secondary breaker. It is assumed that, due to diversity, one kva of transformer capacity will care for 1⅔ hp. of motors. Since branch circuits to 440-volt motors usually require larger cables than do 2300- or 4000-volt motors, fifty cents per horsepower was included in Curve A to cover the cost of the larger 440-volt cables. The one-line diagram of the circuit elements for 440- or 550-volt motors, operating from 2400- or 4160-volt primary systems, is shown in Figure 5. The cost of the low-voltage motors, control, and the step-down unit substation is plotted as a function of motor horsepower rating in Curve A, Figure 1.

Motors Operating Directly at Primary Voltage

When selecting the primary voltage of the power distribution system, it is necessary to consider more than just the prices of the motors and control which operate at primary voltage—i.e., at 2400 or 4160 volts. The approximate prices of high-voltage motors and control only, Figures 6 and 7, are plotted in Figure 1 on Curves B and C.

The cost of the primary system must be considered as well as the cost of the motors and control if the lowest over-all electrical system cost is to be obtained. In factoring the primary system cost, it is assumed that if the power is distributed at 2400 volts, 2300-volt motors will be used; and if the power is distributed at 4160 volts, 4000-volt motors will be used.

In industrial plants with a total demand of a few thousand k-va., the primary power system (i.e., the generating plant or main step-down substation from the utility system) and the primary switchgear and cable cost about $2.00 more per k-va. for 2400-volt primary voltage than for 4160-volt primary voltage. This cost differential will increase to about $4.00 or $5.00 per k-va. for systems about 10,000 k-va. and larger.

Therefore, if a 2400-volt system is arbitrarily chosen in place of a 4160-volt system, the extra cost of the entire 2400-volt over the entire 4160-volt distribution system, plus the cost of 2300-volt motors and control, must be compared with the cost of 4000-volt motors and control for those motors which operate at primary voltage.

This comparison can be made by referring to Curves C and D in Figure 1. These curves show that the 2300-volt motors and control, plus the extra cost of the 2400-volt power system, are more expensive than 4000-volt motors and control. For the general case, then, Curves C and D, and not Curves B and C, should be used when selecting the primary system voltage for plants where a sizable portion of the total connected load consists of motors larger than about 200 hp.

The total *extra cost* of the entire 2400-volt power system over a 4000-volt power system has been included at $4.00 per horsepower of high-voltage motor, i.e., $4.00 per horsepower was added to Curve B to obtain Curve D. This figure ($4.00) is arrived at by assuming that complete 2400-volt power systems cost $2.00 more per k-va.* than 4160-volt power systems, and that an equal k-va. capacity of power system is required for serving motors operating at primary voltage and to serve all other load which is operated at 600 volts or less. If the high voltage motors require only one-

(*) This figure has been verified by many studies made during the past few years. It is beyond the scope of this article to give the derivation of this figure.

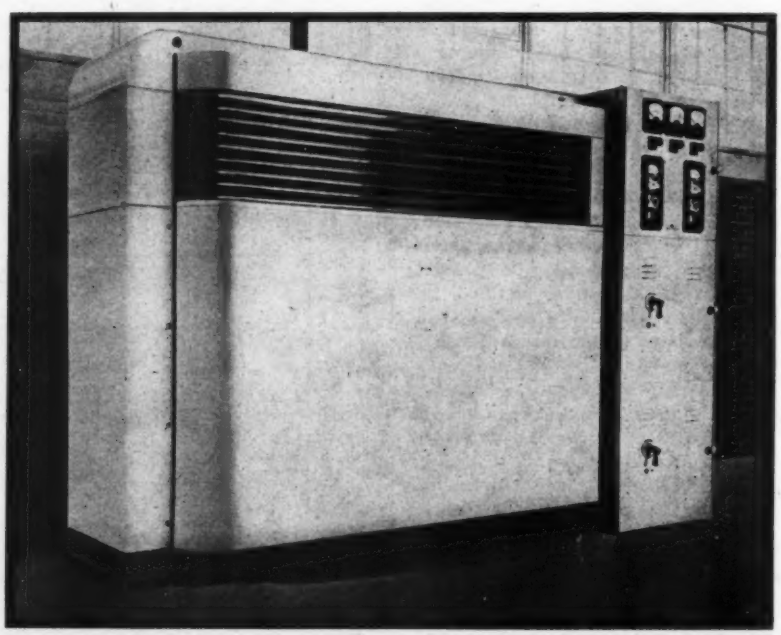


Figure 4

half the system capacity for supplying them, that means that the two k-va. of more costly 2400-volt system capacity (at $2.00 per k-va. extra) is required per horsepower of high voltage motor. That is the equivalent of $4.00 per horsepower of 2400-volt motors.

System costs are usually given in dollars per k-va. but are added in Figture 1 as dollars per horsepower, on the basis that the k-va. and horsepower ratings of high-voltage motors are about equal.

460- or 575-Volt Systems Most Economical for Motors Rated 200 hp. or Less

By referring to the curves in Figure 1, it can be seen that below about 175 hp., 440-volt motors enable the least investment in the electric equipment, regardless of the primary system voltage. Hence all motors rated about 200 hp. or less should be operated on systems rated 600 volts or less, regardless of the primary voltage selected.

A close examination of the detailed prices will show that at 200 hp. the cost of 440-volt motors and starters in step-down substations, Figure 5, is about equal to the cost of 2300-volt motors and starters, Figure 6. This is the reason for placing the arbitrary division at 200 hp. rather than at 175 hp., as pointed out by the curve. These curves represent approximate prices and do not follow detailed variations.

Hence there is no justification for ever arbitrarily selecting 2400 volts as the primary voltage so far as any considerations of motors of 200 hp. and below are concerned.

4160-Volt Primary Systems Usually Give Greatest Over-All Economy

Assuming that there will be a transformation from either 2400 or 4160 volts to supply motors rated 200 hp. or less, the choice between these two primary voltages is based on primary system costs and the cost of motors and control for those motors rated above 200 hp. As pointed out previously, and as shown in Curves D and C, Figure 1, the selection of a 4160-volt system and 4000-volt motors and control (for those motors rated 200 hp.) enables a less expensive over-all installation than the selection of a 2400-volt system and 2300-volt motors and control. In areas where the larger motors (i.e., those above 200 hp.) constitute more than about 50-60 per cent of the total load, 2400 volts may be less expensive providing the total load of the plant is not more than a few thousand k-va.

In general, an equally satisfactory, yet a lower cost power system can be obtained by selecting 4160 volts as the primary voltage for general poyer distribution, rather than 2400 volts.

Where 2400 Volts Is Particularly Applicable

In plants which are served at 2400 volts directly from the utility system, then, of course, it would be more economcial to use 2400 volts directly and to place all motors rated 200 hp. and above directly on the primary

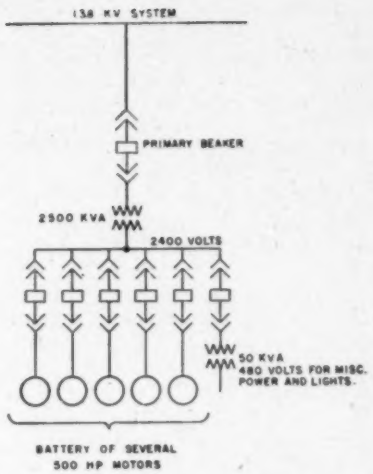


Figure 8—Typical layout for pumping station

feeders. However, in these cases, nearly all motors rated 200 hp. and less should be operated on a 460- or a 575-volt system, stepping down from a 2400-volt primary system. In some cases where there are existing 2400-volt systems in industrial plants, it is often more economical to extend these at 2400 volts rather than change to 4160 volts. However, it may be more desirable to extend it at some higher voltage, like 13.8 kv., rather than to extend the system at 2400 volts. This has proven to be the case in many recently made studies of plants which are to be expanded and modernized. A discussion of this is beyond the scope of this article.

Twenty-four hundred volts is particularly applicable to concentrated loads which supply motors rated 200 hp. and above, and where the primary voltage is above 5 kv. In these cases, it is preferable to step down from the higher voltage to 2400 volts rather than 4160 volts if the capacity per 2400-volt bus is limited to a few thousand k-va., and nearly all of this load is utilized at this bus directly by motors rated above 200 hp.

A typical application where 2400 volts would be most economical is a pumping station, Figure 8, in which the control may be of the fused contractor type or of the vertical-lift power circuit breaker type where the vertical-lift feature is desirable and where the frequency of starting is not too great. If this preference is followed, it will be necessary to make a transformation for these large motors. The cost of the transformation is substantially the same whether it is made to 2400 volts or to 4160 volts. Hence the power system cost is not a significant factor, since all of the load is concentrated in one place. The 2300-

(Concluded on next page)

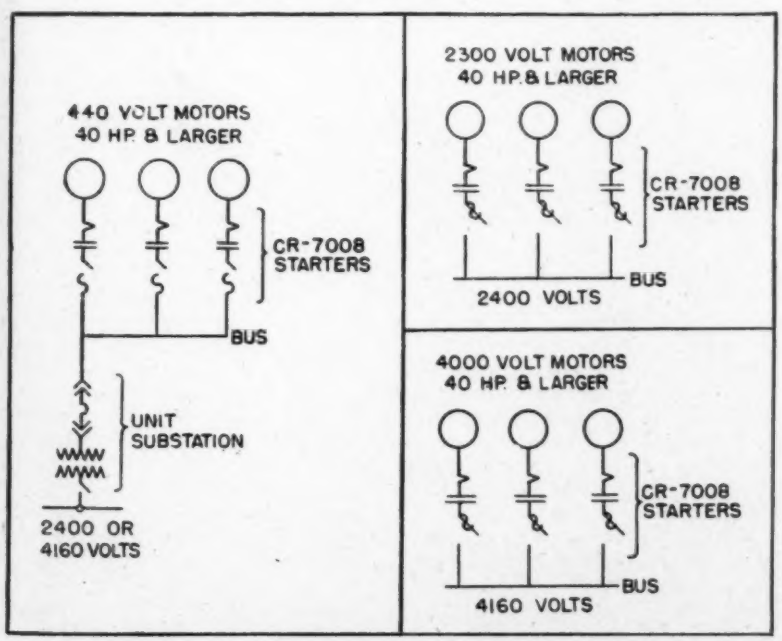


Figure 5 (left), Figure 6 (above, right), Figure 7 (lower, right)

volt motors and their starters are less expensive than 4000-volt motors and their starters. This can be seen by comparing Curves B, C, Figure 1.

Effect of Various Types of Motors and Control

Where 2300-volt motor starters of 50,000-k-va. interrupting rating can be used, some reduction can be obtained in the over-all cost of the 2400-volt installation compared with the lower voltage installation for motors below 200 hp. This merely reduces the crossing points of Curves A and B, Figures 1, to about 150 hp.

Even if plain motor starters (the use of which is not generally recommended) without built-in short-circuit protection are considered for both the 2300- and 4000-volt motors, there will be little change in the relationship of Curves A and B, Figure 2. These variables, together with the effect of explosion-proof requirements, have little bearing on the basic factors presented here. As a matter of fact, most variables, such as special induction motors, or special starters, will tend to make Curve B cross Curve A at a higher horsepower rating than shown in Figure 1. Although Figure 1 is plotted using 1800-rpm. motors as a base, other motor speeds over the 600-3600 rpm. range have little effect on the general relationship of those curves.

Synchronous Motors

There is less price differential between low voltage (600 volts or less) and 2300-volt synchronous motors and control for these voltages. This differential will tend to make Curve B cross Curve A at about 150 hp. instead of 175 hp., as shown for inductive motors, Figure 1.

Motors Larger than 200 hp. Operating at 600 Volts and Below

In many industrial plants, the great majority of the motors are rated less than 200 hp. and hence are operated from 460- or 575-volt distribution systems. In these plants there may be one or two motors which are considerably larger than 200 hp. It is often more economical, depending upon the size of the motor, to operate these larger motors directly from the 460- or 575-volt system than it is to provide a special transformer to step down to 2400 or 4160 volts where the primary voltage is above 5 kv.

Summing it all up, it is, in general, most economical to operate all motors rated 200 hp. and less on systems rated 600 volts or less, regardless of the primary voltage. Where a choice of primary voltage can be made, it is in most cases more economical to select 4160 volts rather than 2400 volts, even where the percentage of motors above 200 hp. is as high as 50 to 60 per cent of the total plant load.

Color Used in Paper Mill — Safety and Morale Improve

(Continued from page 207)

tenance-wise the performance of the paper mill has been more satisfactory since the installation of this color scheme. As was pointed out earlier, however, the color scheme by no means has an undisputed claim to the credit for improvement since several organization and operating changes were made about the same time. But, nevertheless, the more pleasing appearance of the machines, the greater visibility of the working parts, the cheerfulness of the work rooms, and the psychologically acceptability of the colors must have made a valuable contribution.

Our finishing room underwent a thorough face lifting in that all equipment was also repainted according to the over-all scheme. Here, as in the paper mill, the results have been very satisfactory but, again, it cannot be said conclusively that the paint job was more than a contributing factor. This same story, with slight variations, can be told throughout the entire plant.

During the past several years, while this painting program has been in effect, we have reduced our absenteeism to a very remarkable degree. As a matter of fact our absenteeism rate was reduced from 7.9 per cent a week to 2.7 in 1944. The War Manpower Commission tells us this absenteeism rate is one of the most satisfactory in the country. Our turnover rate has decreased in a most satisfactory fashion. Our production rates despite war time conditions of material shortages, unskilled labor and other operating difficulties have remained satisfactory or have in most instances shown a very pleasant increase. Morale-wise general conditions at the plant seem to be satisfactory. The physical plant as a whole is cleaner, more cheerful, and psychologically more acceptable.

As a result of our experience of the past few years with three dimensional colors, we have no hesitation whatsoever in recommending it for the consideration of anyone who is interested in repainting his plant.

In this connection it is interesting to note that about four or five years ago one of our men who worked on the third shift found that quite frequently he was depressed by the coldness of the industrial gray and the high reflectivity of the glossy white which were used throughout the factory. As a result of his personal feelings which amounted almost to a psychological letdown, he made a study of the use of colors and found that some had been employed in hospitals to hasten recovery of patients but that, at that time, there had been little or no industrial acceptance of their value. This man reasoned that if some colors have a therapeutic value to the ailing, why won't they also be of some value to the well? As a consequence an experimental unit was set up using a vivid shade of red to paint the finishing equipment, with orange utilized on the working parts. The result was eye jarring and nerve shattering and certainly did not accomplish its purpose. Nevertheless we persevered with these colors and made some slight changes but since we knew of no expert on the proper use of colors or anyone who could measure their reflective values and thus determine the proper usage of shades and hues, it is quite plausible to assume that the whole project would have been abandoned. With the help, however, of Mr. Brainerd and his associates we have reached our present color scheme and have concluded that it has been quite beneficial to us and there can be little doubt that we will continue its use in the future.

Unfortunately, as was pointed out earlier, it has not been possible to make studies which indicate the value of the color scheme alone and, consequently, we can offer no definite data on the exact degree of improvement which may be expected to result solely from its use. We must, therefore, once again say that our observations are wholly empirical but that we, nevertheless, are convinced that we were on the right track in changing from our conventional industrial painting scheme and that we shall continue to be on the alert for further ideas which may develop in this interesting field.

A New Stain for Identifying *Papermaking Fibers*

NORVAL F. WILSON
Chief Chemist
Alton Boxboard Company

▸▸▸ THIS STUDY has been made with the thought in mind that fiber stains now in use are fairly reliable in the hands of those having had adequate experience. Yet it should be recognized that the making of an improved stain that is more distinctive and consistent, with a full spectrum of colors, will make identification of fibers much more simple. Therefore, in the studies discussed here, effectiveness of the stain in aiding easy identification of the fibers is of primary importance.

The composition of each of the popular stain formulas includes certain ingredients which might very well be replaced with others that would be more effective. Potassium iodide is used in the majority of these stains, and quite an improvement can be anticipated through elimination of the potassium ion. Chlorides may be reduced to minimum requirements in the iodine type stain. Certain hygroscopic salts commonly used because it is contended that they intensify colors, seem to be responsible for an overlapping in coloration even to the extent that a single fiber may show different colors throughout its length. For purposes of fiber analysis it is essential that each of the commercial grades of pulp shall have a uniform coloring regardless of the normal differences in the degree of cooking. On the other hand, the effects of bleaching should be easily recognized.

A formula which has been developed in an effort to attain the desired results is given in Table I. The choice of cadmium iodide as the salt to be associated with the iodine is based upon a number of plausible considerations, and some of the results obtained with this stain can be traced to its presence. Formaldehyde has a stabilizing action and the amount used improves the brilliancy of the colors without causing the overlapping of colors which was mentioned above. The stain can be easily prepared in about fifteen minutes ready for immediate use. No sediment forms. The solution keeps well in an amber bottle.

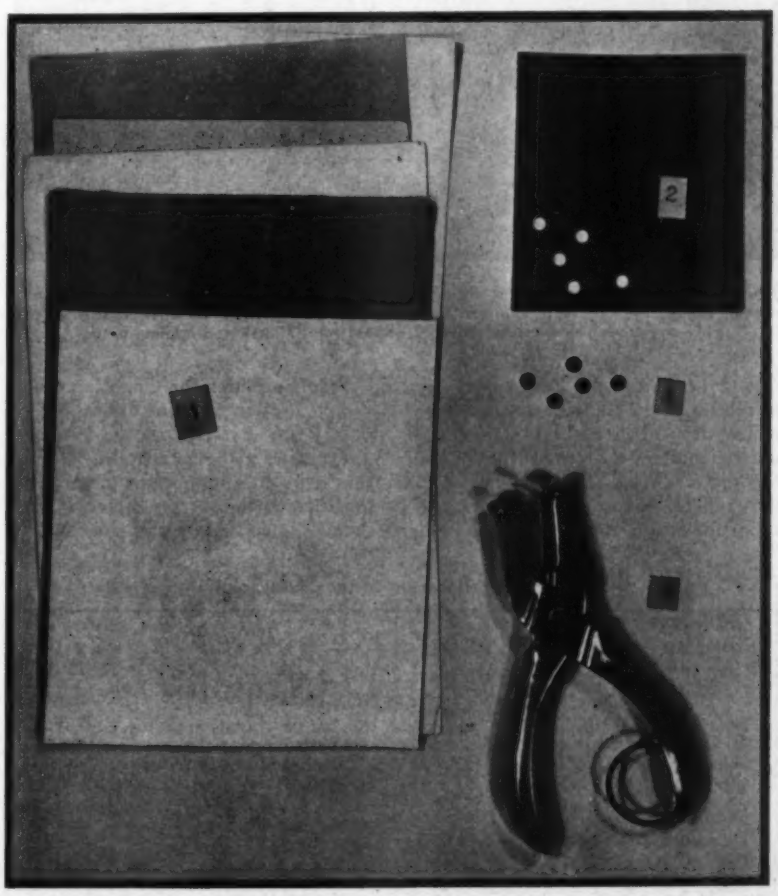
Preparation of Pulp for Fiber Analysis

A small hand punch is used to cut disc samples about 3/16 inch in diameter from the paperboard to be examined. If the board has liner, underliner, and filler, the discs can be split with a dissecting knife. The sample discs are disintegrated with least injury to the fibers by shaking in a miniature ball-mill consisting of a stoppered test tube containing a few glass beads and the proper amount of distilled water as determined from the weight of the sample used. This technique conserves a small sample so that other tests can be made.

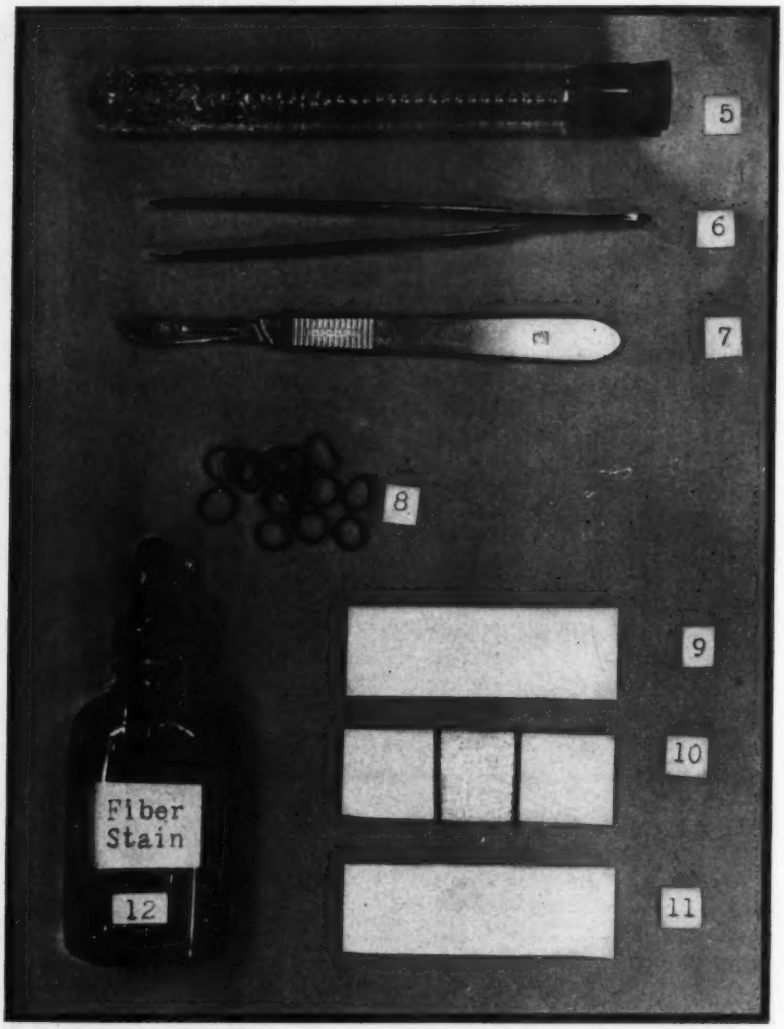
Very often additional information will add greatly to the value of a report on the fiber content of a paper sample. The caliper usually can be taken. It is further possible to obtain the weight per thousand square feet from the weight of a number of the hand punch discs which are used in the fiber analysis. Table II shows the method of establishing the conversion factor for the punch. It is not necessary to know the diameter or the area of the small disc samples, and it should be evident that the weight of the chosen number of discs, multiplied by the factor (in this case 2260) will give the weight per thousand square feet. This method is applicable to samples of less than one square inch in area, and also to any sample of irregular contour and unknown area, such as a carton blank or a perforated board. The ease of conversion to the basis weight system greatly simplifying reporting results on other small scale tests for the amount of sizing, weight of fillers, adhesives and coatings.

Preparation of Microscope Slides

A convenient method for preparing slides which has many advantages over the usual ink-line method is shown in one of the illustrations. Small rubber bands made from gum rubber



1—Pure fiber sheets; 2—paperboard sample; 3—paper discs for fiber analysis; 4—hand punch.



5—Test tube with glass beads and distilled water; 6—forceps; 7—dissecting knife; 8—No. 6 rubber bands; 9—microscope slide; 10—fiber suspension on slide between rubber bands; 11—dry fibers on finished slide; 12—fiber stain in amber dropping bottle.

tubing (or No. 6 Rubber Bands) are placed over the slides and spaced to retain the fiber suspension on the square area in the center portion of the slides. When the slides are dry, the rubber bands are removed and saved for future use.

Practice Slides for Checking the Action of Fiber Stains

It is more restful to the eyes and it expedites the examination of practice slides if a number of fibers having good color contrast appear on each slide. Equal weights of the Bureau of Standards Pure Papermaking Fibers are used. The arrangement of the fibers as shown in Table III includes on each slide at least one easily recognized fiber which serves to "tag" it, and labeling is, therefore, unnecessary. In using the stain, place a few drops on the slide, apply a cover glass and after about ten seconds remove the excess solution from the edges of the slide with a blotter. The colors develop quickly and the slide may be examined at once. The usual technique for counting the fibers on a slide is followed and the percentage of the various pulps in the furnish is accurately determined.

Table III shows the colors which can be observed with the various common papermaking fibers when the stain is working properly. The color descriptions are, of course, approximate, and some knowledge of fiber structure will be necessary if classifications are to be absolutely accurate. For example, straw gives a number of colors but its peculiar cell structure prevents it from being confused with any other fiber. With experience in the use of this stain and a little knowledge of fiber structure gained through observation, it is possible to identify many of the less common fibers not listed in this table.

Comments from those who try this new formula will be appreciated. The results of the foregoing study are published with the hope that the formula presented can be further improved by those who are interested in fiber identification.

TABLE I—Preparation of the Stain Solution

Iodine crystals, C.P.	0.8 gr.
Cadmium Iodide, C.P.	35.0 gr.
Distilled water	50.0 cc.

Heat the above to 110 Fahr. and break the Iodine crystals with the end of a stirring rod. Decant the solution from one beaker to another to observe the point where no undissolved solids remain. Then add the following, in order, with stirring:

Distilled water	90 cc.
Formaldehyde	7 cc.
Calcium nitrate, C.P. $Ca(NO_3)_2$ $4H_2O$	70 gr.
Cadmium chloride, C.P. $CdCl_2$ $2\text{-}1/2$ H_2O	20 gr.

TABLE II—Conversion Factor for Basis Weights

Samples of known weight (lb./1000 sq. ft.)	Weight of 5 discs (grams)	Weight per 1000 sq. ft. Weight of 5 discs
30	.0133	2256
62	.0274	2263
71	.0314	2261
106	.0469	2260
Conversion factor (average)		= 2260

TABLE III—Colors Produced by the Stain on Papermaking Fibers

Slide a.	
Soda	Purple
Linen rag	Pink
Kraft	Brown, some grey
Slide b.	
Groundwood	Yellow
Unbleached sulphite	Colorless
Bleached sulphate	Blue
Slide c.	
Bleached sulphite	Lavender
Cotton	Red
Straw	Green predominates

Trouble Shooting on Sulphate Black Liquor Evaporators

W. W. HENDERSON

Southland Paper Mills, Inc.

▶▶▶ ONE OF THE IMPORTANT factors in the economical operation of sulphate pulp mill is the maximum recovery of chemical in the spent cooking liquor from the digesters. The first step in this recovery of chemicals is the washing of the pulp in diffusers or on vacuum filters.

The liquor obtained through the washing operation contains a high percentage of water. To make it possible for the combustible material in the liquor to be burned as a further step in the recovery process, it is necessary to evaporate or drive off the excess water. Desired results in this evaporation operation are obtained with multiple effect vacuum evaporators.

It is rather difficult to obtain an exact analysis of the black liquor to be evaporated. Its characteristics vary somewhat with the composition of the white liquor originally used in cooking the pulp, with the wood species being pulped, and with the method of cooking.

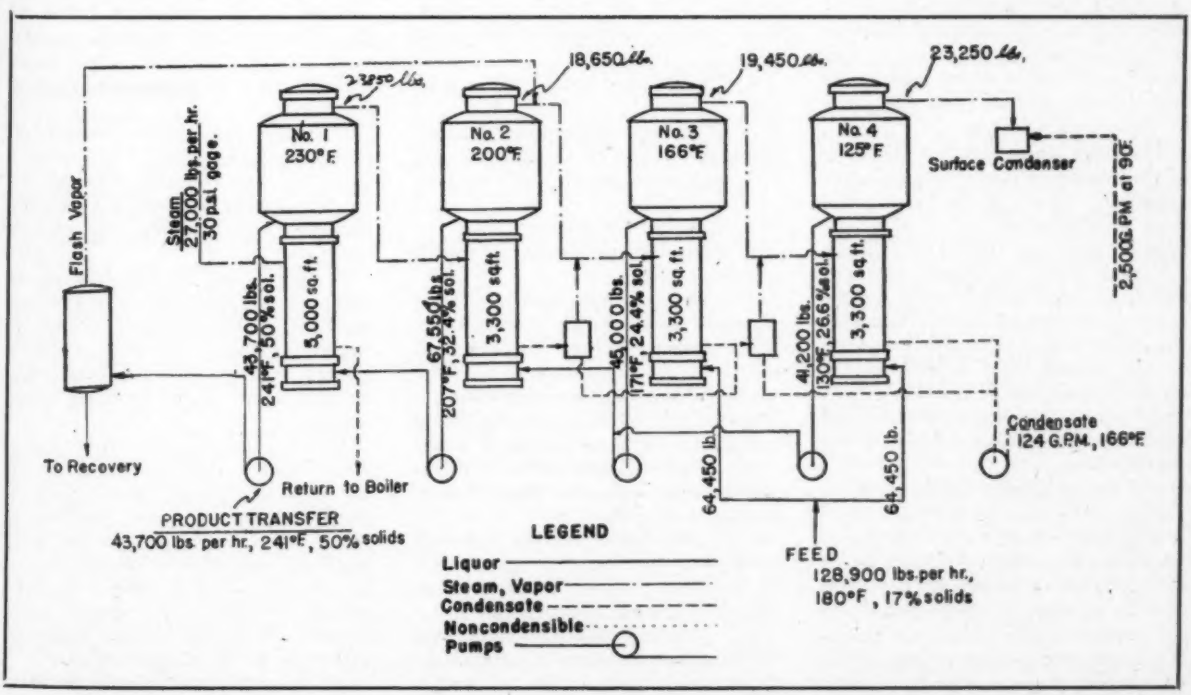
Most of the alkali which is present is in the form of sodium carbonate (Na_2CO_3), or as organic compounds related to sodium carbonate. The balance of the liquor consists mainly of caustic soda (NaOH), and sodium sulphide (Na_2S), with very small amounts of salt cake (Na_2SO_4), sodium chloride (NaCK) and traces of potash, alumina, iron oxide and lime. The distinctive odor of the liquor comes from the organic sulphur in it together with sodium sulphide and mercaptans.

Rosin soaps in the liquor cause foaming when the liquor is handled. The most trouble with foam occurs at low concentrations, the liquor becoming very viscous at high concentrations.

The total solids in an average liquor would weigh slightly less than one and one-half times the Baumé reading at 60 Fahr. For example, a 12 degree Bé, Fahr. liquor would contain about 17½ to 18 per cent solids.

A liquor containing 17½ to 18 per cent total solids should give excellent results in the evaporator. Such a liquor should be expected if the following conditions are met: a 20° Bé white liquor at 180 Fahr. temperature for cooking, direct steam for cooking, a liquor circulating system on the digesters, a closed vacuum washing system, and good alkali recovery.

A four-effect evaporator, recently installed (see illustration below), was designed for the handling of black liquor from 175 tons daily pulp production or for a feed of 128,900 lb. of 180 Fahr. liquor with 17 per cent solids content (initial density of entering liquor) per hour. This evaporator was guaranteed to concentrate the specified volume to 43,700 lb. at 50 per cent solids. In other words, the evaporator was designed to evaporate 85,200 lb. of water per hour, based on a liquor with 3,000 lb. of solids per ton of pulp at a liquor feed temperature of 180 Fahr. Entrainment loss was limited to 1/10 of one per cent. Steam requirements were fixed at 27,000 lb. of 30 lb. gauge per hour; and surface condenser requirements, at 2,500 gallons of water per



Flow sheet of a long tube, vertical, quadruple effect evaporator. For a mill producing 175 tons of pulp per day. Capacity: 3,000 lb. solids to evaporator per ton of pulp

minute at 90 Fahr. and 26 in. vacuum on 4th effect.

The heating surfaces of the evaporator are made up of 2 in. diameter tubes. There are 5,000 sq. ft. of heating surface in the first effect, and 3,300 sq. ft. in each of the other three effects.

The tubes making up the heating surface in each effect are nested together in a vertical arrangement through the use of a top and bottom tube sheet. The steam or vapor is thus contained in the chest which surrounds the tubes. A vapor chest or dome in the form of an enlarger top is mounted on the top of each effect and completes each body. The liquor through the evaporator is in the opposite direction to that of steam and vapor. The liquor usually enters the last two effects, part going to the third effect and part to the fourth effect, while steam enters the steam chest of the first effect. Control of the liquor flow usually apportions a greater volume to the fourth effect than to the third.

The liquor pumped from the fourth and third effects to the second effect and in turn to the first effect is heated in the first effect to a temperature of about 230 Fahr. This temperature causes vapor to rise from its top surface and which in turn passes into the dome at the top of the evaporator body. The liquor, however, in its finally concentrated form is discharged from this effect to storage, passing through a flash tank enroute to remove any residual vapor and to lower the temperature of the liquor. Any vapor thus removed is sent back to the vapor discharge line from the dome of the second effect.

The vapor which rises into the dome of the first effect passes through interconnecting piping to the heating element of the second effect, the temperature dropping from 230 Fahr. in the dome of the first effect to about 200 Fahr. upon delivery to the steam chest of the second effect. Likewise, the vapor which rises into the dome of the second effect is delivered to the heating element of the third effect, and, in turn, the vapor of the third effect, to the heating element of the fourth effect.

The temperature of the vapor entering the steam chest of the third effect is about 165 Fahr., while the vapor leaves the dome of the fourth effect at a temperature of around 125 Fahr. This latter vapor is delivered to a surface condenser from which the resulting condensate goes to storage, drain, or is otherwise disposed of by a pump.

The condensate from the steam chest of the first effect is usually sent to hot water storage while that from the second and third effects, passing through flash tanks, is finally sent to the sewer along with the condensate from the heating element of the fourth effect. Condensate which flashes to steam in the flash tanks passes to the vapor line for use in the succeeding effect.

This procedure of evaporator operation puts a pressure of about 15 lb. on the dome of the first effect and a pressure of about 3 or 3½ lb. on the second effect, while the third and fourth effects operate respectively under a vacuum of 10 in. and 24 to 25 in.

Starting up Procedure

In starting up a new evaporator unit, it is always good practice to obtain instructions from the manufacturer and to follow them. While all multiple effect vacuum evaporators are somewhat similar in methods of operation, it pays to proceed "according to Hoyle."

For the evaporator just described, a long tube vertical quadruple effect, the start up schedule is as follows:

1. Fill each effect with water from supply line to about 6 in. above top tube sheet
2. Close discharge valves on all removal pumps
3. Start circulating by opening circulating valves
4. Start water through condenser
5. When vacuum on fourth effect reaches 16 in. to 17 in., open steam valve slightly to maintain low steam pressure
6. Check condensate pumps and start them
7. Build up temperature in first effect until it reaches about 230 Fahr., and vacuum in fourth effect rises to 24 in. to 26 in.
8. Close all circulating valves
9. Start feeding liquor to fourth and third effects
10. See that first removal valves are open for discharge to sewer
11. Open discharge valves and start fourth, third, second, and first removal pumps in the order listed
12. Make necessary temperature and Baumé tests on incoming liquor
13. Test discharge from first removal pump until a one degree Baumé reading is reached.
14. Close valve to sewer and open valve to weak liquor storage
15. Increase steam pressure as required to bring liquor strength up
16. When the liquor strength is up to requirements—usually around 35 Baumé, open valve in line to concentrated liquor storage.

Here are a few troubles which the evaporator operator must guard against on the start up.

1. Too much steam to first effect with consequent liquor pull over to flash tank. The cure for this most common evaporator trouble, which results in liquor losses, is careful handling of the steam valve and immediate reduction of steam flow when necessary.

2. Incoming weak liquor concentration drops. An increase in steam pressure usually takes care of this situation unless the drop is considerable. If the drop is considerable, it may be necessary to decrease liquor flow to the unit.

3. Concentration of incoming liquor increases. To keep the unit in balance, decrease steam pressure and increase liquor flow.

4. Pumps stop because of power shut-off. Immediately shut-off steam and add weak liquor or water to first effect until pumps are back in service.

5. Foam becomes bothersome. Stop liquor feed, and add water to fourth effect to boil until the foam clears up.

6. Condensate pumps not equipped with self-priming arrangements, give trouble. Make the pumps self-priming before starting up.

7. Pump fails to prime. Look for air leaks on suction side of pump. Submerge discharge line in water. If bubbles appear, the pump is pumping air.

Or blank pump inlet with flange and use vacuum gauge on pump to check for sufficient vacuum for lift involved. If condition is not satisfactory, check both pump and suction line for leaks.

8. Pump loses prime because of plugged suction line. If vacuum gauge installed at pump, does not indicate sufficient vacuum for suction, dismantle piping hookup and unplug line.

9. Mechanical defects show up in pumps. All pumps should be checked periodically for excessive corrosion, worn impellers, impellers rubbing against casings, worn shafts, etc. Prompt repairs should be made when needed.

10. Vapors or gases enter pump with liquor. This trouble is one of the meanest to run down. Just a small amount of vapors entering a pump at atmospheric pressure may build up considerable volume conditions existing in the pump with consequent lowering of the pressure head. Operate the pump on cold water to determine if this trouble exists.

11. Liquor viscosity too high. May overload pump motor. Always run

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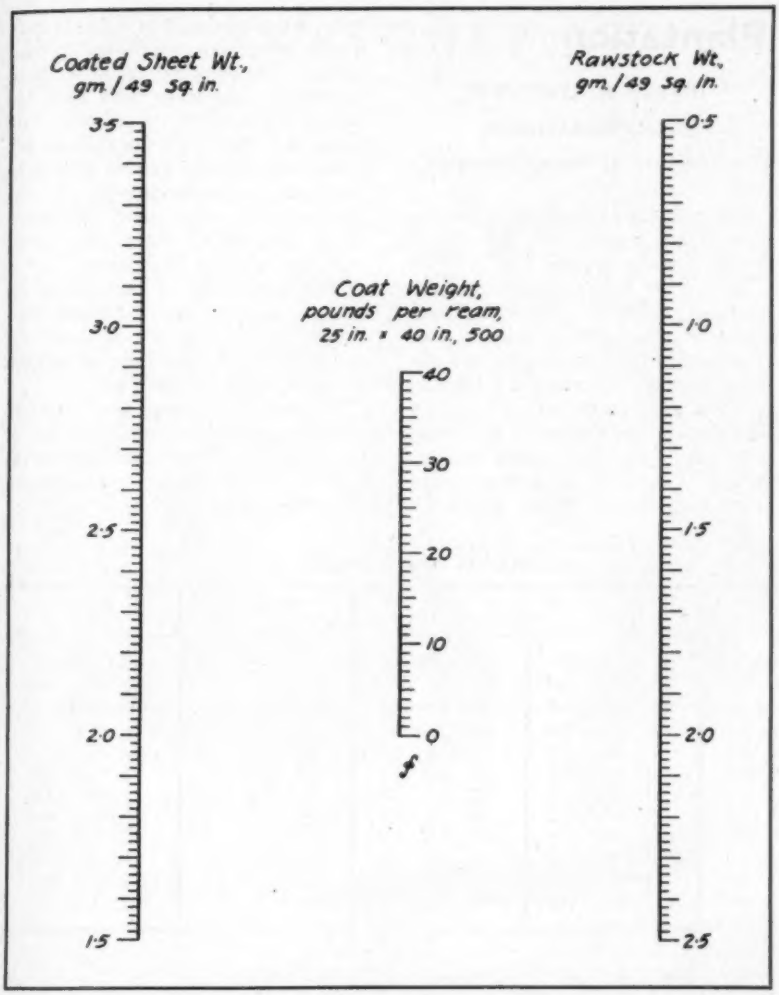


Coat Weight Nomograph

D. S. DAVIS
Wyandotte Chemicals Corp.

▶▶▶ IN CONNECTION WITH the testing of coated paper, the weight of the coating, in pounds per ream, can be determined by multiplying the difference in weights of equal areas of coated paper and rawstock, similarly conditioned, by a suitable factor. When the weights, in grams, of sheets 7 in. x 7 in. are known, the factor for 25 in. x 40 in., 500 ream is

$$\frac{(25)\ (40)\ (500)}{(7)\ (7)\ (453.6)} \text{ or } 22.50$$

Calculation of coat weight can also be effected by the accompanying nomograph which was constructed by methods described previously (1). The use of the chart is illustrated as follows: What is the coat weight, in pounds per ream (25 in. x 40 in., 500) when sheets of coated paper and rawstock seven inches square and conditioned similarly weigh 2.50 and 1.90 grams respectively? Connect 2.50 on the coated sheet weight scale with 1.90 on the rawstock weight scale and note the intersection with the coat weight scale as 13.5 pounds per ream.

[1]Davis, D. S., *Empirical Equations and Nomography*, Chap. IV, New York, McGraw-Hill Book Co., Inc. (1943).

Trouble Shooting . . .

pump at manufacturers' recommended speed.

12. Scale or other deposits, also poor mechanical adjustment, lower efficiency of pump. Check for these troubles at every opportunity.

13. Faulty removal of condensate. Watch condensate sight glasses for level build up which indicates faulty removal. Correct this condition by opening bypass line or regulating valve and by pass condensate temporarily until trouble clears up.

14. Liquor accumulation in dome sight glasses. Check pump. It either has stopped or seal has broken.

When an evaporator unit is operating satisfactorily, let it alone. Slight upsets in conditions usually right themselves without adjustment by the operator. If such conditions do not clear up in a reasonable time, then go after them.

Shutting Down Evaporator

When an evaporator is to be shut down, a few simple operations performed in sequence will bring best results. Both evaporator manufacturers and experienced operators agree that for a short shut down, the following routine should be followed:

1. Thin down liquor in first and second effects with weak liquor or water.

2. Cut off liquor to fourth effect and replace with water, allowing it to follow the liquor through the unit.

3. Check discharge of first effect removal pump, allowing concentrated liquor to go to strong liquor storage until the Baumé reading reaches minimum for strong liquor. Send remaining liquor to weak liquor storage until Baumé reading checks one degree. Then cut to sewer and flush evaporator effects until discharge is clear.

4. Close steam valve to first effect.

5. Cool down unit by circulating water through all four effects.

6. Shut down condensate pumps as soon as no more condensate is forming.

7. Shut off water to condenser and evaporator.

8. Shut down removal pumps and close discharge valves.

9. Open and drain all four bodies.

10. If shutdown is lengthened by necessity of repairs to unit, it may be necessary to refill unit with water; and, when cool enough for repairs, drain again.

◆

. . . Foreign Markets

(Continued from page 210)

such as glass, silver, arts, furnishings and textiles.

Discussions are now going on in London as to the future use of Swedish Merchant Marine, of which 1,200,000 tons of Swedish shipping is now idle in Swedish ports. As soon as conditions permit, this shipping will be put to work.

France

Complete liberation of France has sparked new interest in French trade possibilities. The Post Office Department announced on November 4

A Pulpwood Plantation

IRVING H. ISENBERG
Research Associate
The Institute of Paper Chemistry

▶▶▶ IN THE "RAVINE" to the rear of the main building of The Institute of Paper Chemistry (Appleton, Wisconsin), a total of 400 transplants were set out in 4 x 5 ft. spacing in April of 1940. There were 50 trees each of eight American and European species; they were not intermixed. The transplants were 2-1 stock obtained from the Nekoosa-Edwards Paper Company nursery. The planting spots were scalped and each tree carefully planted in a hole dug with a spade.

The soil in the "ravine" is classified as superior silt loam with a red clay subsoil. The area had been grazed by one cow and hay had been cut from the grassiest spots for several years previous to planting. A few of the typical herbaceous plants growing in the area are goldenrod, heal-all, dock, aster, dandelion, evening primrose, milkweed, strawberry, clover, melilotus, timothy, and sedge. The woody plants in the immediate vicinity are American elm, aspen, basswood, cottonwood, red and white oak, white ash, hawthorn, shagbark hickory, and silver maple. Sufficient soil moisture is available normally. In fact, since additional fill was made on the "ravine" bank a few years ago, there is too much in one section of the plantation. Weather data for this locality may be obtained from the U. S. Weather Bureau records.

All trees in the plantation have been measured for height at the end of each growing season. The number of survivors, their average height, and the tallest tree are summarized by species in Table I for each year since establishment. After five years in plantation (total age, eight years) the survival is 75 per cent, the average height is 2.7 feet, and the tallest tree is 9.0 feet. As can be seen in Table I, some species have done much better than others. The principal causes of death and injury appear to have been excessive soil moisture for red and white pines and sun scald for balsam fir. Other contributing factors have been weed competition, winter drouth, rabbits and mice, larch sawfly, and snow. Some replacements have been made, but these will not be discussed.

The height data at the end of the 1944 season are analyzed more thoroughly in Table II, which shows the distribution of trees in the various arbitrary height classes.

Phenological studies were initiated a few years ago on selected trees of each species. These data will be reported when further measurements have been made.

TABLE I—Height Growth and Survival of Trees
(Fifty trees of each species were used in the initial planting)

	Initial		1940			1941			1942			1943			1944		
	Height*			Height			Height			Height			Height			Height	
	Av.	Max.	No.	Av.	Max.	No.	Av.	Max.	No.	Av.	Max.	No.	Av.	Max.	No.	Av.	Max.
Jack pine	0.6	1.0	48	1.1	1.7	45	1.6	2.8	45	2.6	4.7	41	4.0	6.7	41	5.3	9.0
Scotch pine	0.5	0.8	49	0.8	1.1	45	1.2	1.9	45	1.9	3.1	44	2.5	4.2	40	3.3	5.3
White pine	0.4	0.5	50	0.5	0.7	44	0.7	0.9	40	1.0	1.6	35	1.2	2.0	34	1.5	2.5
Red pine	0.4	0.7	49	0.6	1.0	47	0.8	1.3	40	1.1	2.1	26	1.3	2.4	25	1.5	2.8
White spruce	0.4	0.6	49	0.5	0.7	49	0.7	1.1	49	1.0	1.8	49	1.4	2.2	47	1.6	3.1
Norway spruce	0.4	0.6	49	0.5	0.7	49	0.8	1.2	49	1.3	2.2	49	1.6	2.9	47	1.9	3.6
Balsam fir	0.3	0.5	46	0.4	0.7	43	0.5	1.1	39	0.7	2.0	34	0.9	2.3	30	1.1	2.8
European larch	0.8	1.2	49	1.0	1.4	43	1.7	2.8	42	2.3	4.0	38	3.2	4.8	38	5.0	8.2
Total	0.5**	1.2	389	0.7	1.7	365	1.0	2.8	349	1.5	4.7	316	2.0	6.7	302	2.7	9.0

*Height in feet; **Weighted average.

TABLE II—Distribution by Height Classes

Species	Height Class in Feet						
	Below 1.5	1.6-3.0	3.1-4.5	4.6-6.0	6.1-7.5	7.6-9.0	Total
Jack pine	1	4	5	18	11	2	41
Scotch pine	3	16	13	8	..	..	40
White pine	19	15	..	..	..	..	34
Red pine	17	8	..	..	..	..	25
White spruce	28	18	1	..	..	..	47
Norway spruce	15	29	3	..	..	..	47
Balsam fir	24	6	..	..	..	..	30
European larch	2	2	10	13	9	2	38
Total	109	98	32	39	20	4	302

. . . Foreign Markets

(1944) that five cent postal service to France was available. Treasury officials disclosed that funds previously frozen in this country now may be freely used by the De Gaulle Government. But normal business conditions cannot be reestablished for some time to come, if only because most railroad bridges in France have been destroyed; transport and communications systems are in serious condition.

Meanwhile France needs $63 million worth of gasoline, $5 million worth of synthetic rubber and carbon black, $24 million of wood, $15 million of non-ferrous minerals, $4 million of hides, $169 million of textile raw materials. This by no means the total of her requirements, but indicates her most serious immediate shortages. Machine tools, for example, will also be needed, although not to the extent previously expected. Reduced figures are based on the fact that machine tools last 18 years in French hands as against 6 years in American plants. For some time to come, most French purchases here will continue to be made through the French Supply Council. Metropolitan French Division is located at 2100 Adams Mill Road, N. W., Washington, D. C.

Paper SKETCHES . . . . . .

THE ANCIENT MOHAMMEDAN LAW

WHICH PERMITTED SLAVES TO PURCHASE THEIR FREEDOM APPEARS TO HAVE BEEN THE REASON WHY THE CHINESE PAPERMAKERS, CAPTURED BY ARABS AT SAMARKAND IN 751, PASSED ON THEIR KNOWLEDGE TO THE WESTERN WORLD.

WORLD WAR II

WITNESSED A PROGRESSIVE DECREASE IN THE PRODUCTION OF PAPER IN FRANCE FROM 1,398,188 TONS IN 1936 TO 200,733 TONS IN 1944

IN EARLY DAYS THE RITTENHOUSE MILL SUPPLIED THE PUBLIC LEDGER OF PHILADELPHIA WITH NEWSPRINT.

TYPE AND PRINTING BLOCKS WERE BEING MADE FROM PAPER PULP IN 1886.

ALLIED

NOVEL SALVAGE PLAN PUTS OLD CARTONS BACK TO WORK

While the nation has been hard at work salvaging critically needed wastepaper, the Sherwin-Williams Company has instituted in co-operation with WPB, a program of salvage for shipping cartons, which has netted some 738,000 for re-use.

The program has been so effective that today, customers may be getting their paint delivered in cartons that originally carried anything from soap to soup.

The plan in force is a simple one which starts with the district manager. He makes his appeal to customers through the representatives and store operators to use utmost care in opening, unpacking, flattening and returning every usable carton, to either dealers, or Sherwin-Williams factories and warhouses.

When the cartons are sent back to the factory, they are carefully checked and processed for re-use. Some of the cartons that are torn are repaired on stitching machines. Those that are beyond repair, due to many uses, are cut into sections and used for dividers, stuffers and liners. The left-over scrap from the cartons that are cut up to make dividers and stuffers are salvaged, too. Nothing is wasted. This waste material is sent back to the paper mills for reprocessing, as a part of Sherwin-Williams' carton salvage program.

▶▶▶ WESTINGHOUSE ANNOUNCES that a change in the company name became effective May 12. The full name of the company, "Westinghouse Electric and Manufacturing Company," was long and unwieldy, and for the sake of simplicity and brevity, the Board has chosen *Westinghouse Electric Corporation* as the new name.

◆

ELECTRO-COATINGS, INC. PLANS SPECIAL SERVICE TO THE PAPER INDUSTRY

A relatively new company, Electro-Coatings, Inc., Chicago, is announcing to the paper industry that it is making extensive plans to serve paper and pulp mills as soon as circumstances permit it to convert facilities from war work operations.

Although this company is relatively new, its personnel is well known for knowledge and experience in both the practical and theoretical side of electroplating. A number of men in the organization, like John S. Mohr, John T. Daker, Carl T. Dostale, and Howard L. Garvens were active with another plating concern for a good many years. They participated in developing and pioneering the various successful applications in the pulp and paper industry. Mr. Dakker will be remembered by many in Indiana and the Miami Valley district in Ohio; Mr. Mohr is known to many in Wisconsin and Minnesota.

The company expects to convert its facilities to handle such paper and pulp mill applications as flat and curved screen plates, press rolls, coating applications, drum dryers, embossing rolls, electrotypes, copper rotogravure printing cylinders, guide rolls, and other proven ones. As complete a service as possible is being planned for the mills.

◆

IMPCO ACQUIRES FOUNDRY

The Improved Paper Machinery Corporation of Nashua, New Hampshire, has purchased a gray iron, Ni-resist and bronze foundry at Manchester, New Hampshire, and has organized a wholly owned subsidiary corporation under New Hampshire law, known as Manchester Foundry, Inc. William F. Griffin, former owner, will continue as president of the new corporation. The foundry is being modernized and new equipment is being installed as conditions permit.

Another purchase by Improved is a tract of land of 26,000 square feet on which a modern woodworking and pattern making plant was in the process of being established. The Company plans to use the facilities of this plant for building all cypress vats and other equipment and to enlarge their facilities for pattern making.

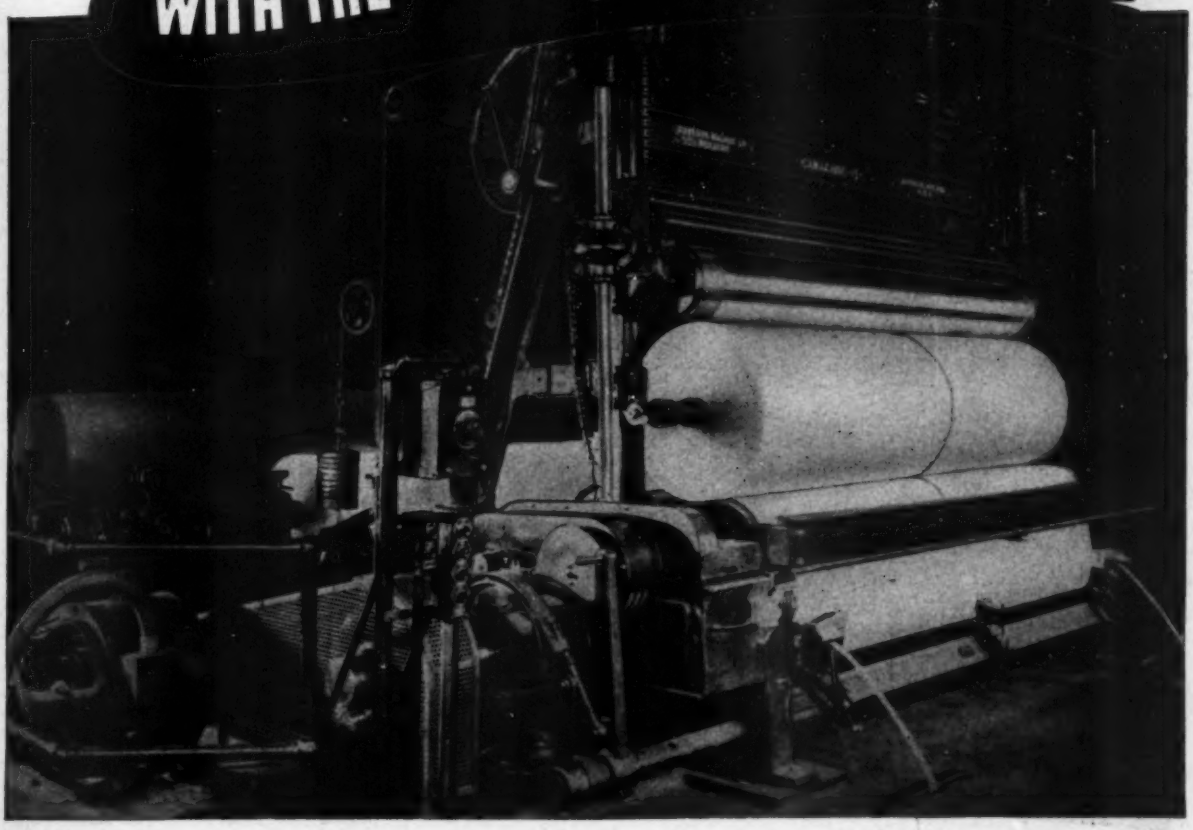
◆

▶▶▶ THE OFFICES of George F. Hardy, consulting engineer to the paper industry, have been moved from 305 Broadway to 441 Lexington Avenue, New York 17, N. Y. The telephone number will be Vanderbilt 6-4144 and 4145.

LEFT—At the Sherwin-Williams carton rebuilding department, thousands of used cartons are repaired and kept in circulation. The few minutes spent in salvaging old cartons has paid tremendous dividends in saving paperboard for vital war uses. . . . RIGHT—Cartons of all types are welcomed at the salvage depot, where they are repaired or cut down and restitched for additional use in paint deliveries. Customers receive from five to ten cents per carton for their help in the salvage work

wind 'em as you want 'em

WITH THE CAMACHINE 15



Some like a hard paper roll, some like 'em soft and some like 'em medium hard—*but,* all want paper rolls that handle easily, ship well and arrive in good condition. The "Timken Bearing Equipped" Camachine 15, manufactured by Cameron Machine Company, Brooklyn, N. Y., is designed and built to solve this problem—to assure production of rolls at densities to suit the requirements of all customers, and at speeds well ahead of the tonnage output of your paper or paper-board machine.

"More and more paper" is the watchword in the industry today and Timken Bearings on the Camachine 15 help speed production by reducing friction to a minimum. Complete protection against radial, thrust and combined loads is provided, correct and constant roll alignment is assured, endurance is increased, and lubrication and maintenance problems are minimized because Timken Bearings are on the job.

"Timken Bearing Equipped" is the symbol of superior performance and lasting satisfaction on the machinery you manufacture or operate. Be sure the trade-mark "TIMKEN" is on every bearing you use!

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

TIMKEN
TAPERED ROLLER BEARINGS

ARMY - NAVY "E" AWARDS

Economy Pumps, Inc. Hamilton, Ohio—For outstanding accomplishment in the production of war equipment, this company was presented with the coveted Army-Navy "E" pennant on March 20. Formal presentation took place at the factory and was attended by about 500 employees, company officials and friends. Lt. Col. Andrew L. Fabens, U. S. Engineers, made the award which was accepted by R. H. Thomas, company president. No social festivities attended the program. The employees felt the best acceptance of the award was to return to their jobs.

River Raisin Paper Co., Monroe, Mich.—Very colorful ceremonies on April 23 marked the presentation of the Army-Navy "E" pennant to this company. Major Nelson W. McCormick, chief of the Security Division, Detroit Ordnance District, made the presentation. The award was accepted by Charles L. Wood, vice president and general manager of the company.

Westinghouse Electric Corporation Sunbury, Pa.—This company's Home Radio Division at Sunbury recently received the company's 25th Army-Navy "E" award. This plant has been one of the prime suppliers of radio and radar equipments for the Army and Navy.

Fourth Star

The men and women of *Hammermill Paper Company,* Erie, Pennsylvania, have won the "E" award for the fifth time. The pennant which flies over the plant now has four stars.

A fourth star has been added to the original Army-Navy "E" pennant, first hoisted over the Industrial Electronics and X-ray Divisions of the *Westinghouse Electric Corporation's* plant at Baltimore, Maryland, in September, 1942.

For consistent and extensive operations in support of the war effort, often involving as much as 97 per cent of its capacity, *Shartle Bros. Machine Co.,* Middletown, Ohio, has been awarded a fourth start for its Army-Navy "E" pennant.

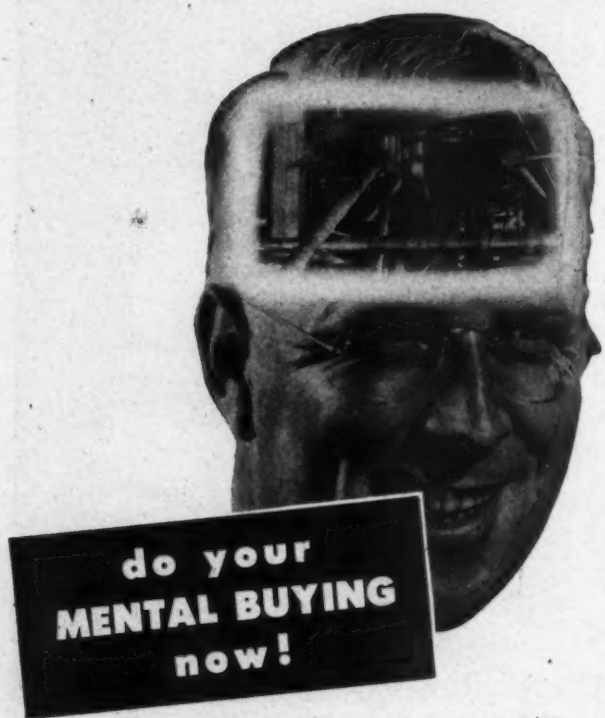
Fifth Star

A new five-starred Army-Navy "E" pennant is pointed to with pride by the employees of the *Reliance Electric & Engineering Company,* Cleveland. One eventful week brought the award of both the fifth star for the "E" flag and the second star for the company's Maritime "M" flag.

Simple ceremonies which accompanied the raising of the new five-starred flag at the Elevator Division of *Westinghouse Electric Corporation,* Jersey City New Jersey, were combined with a commemorative tribute to the Division employees who have lost their lives in the war. This plant received its first "E" flag—from the Navy—in September, 1941. It was among the first war plants to be granted the joint Army-Navy "E" when that award was first established.

◆

▶▶▶ A NEW RESEARCH laboratory will be constructed in Brecksville, Ohio, by The B. F. Goodrich Company, according to a recent announcement. Brecksville is 20 miles from the company's plant in Akron. Plans have been completed and construction work will be started as soon as possible. Dr. H. E. Fritz is company research director.



do your MENTAL BUYING now!

In making your post-war plans, you'll want to install the light-weight pipe that can give you the stepped-up performance required for more efficient paper mill operations.

No other light-weight pipe gives you all the advantages of Naylor's exclusive Lockseam Spiralweld structure. You'll like its light weight. Its greater strength. Its speed and ease of installation. Its leaktightness. Its extra safety. Its revolutionary coupling methods. Its savings in steel, time, maintenance and money. It will pay you to do your mental shopping now and include Naylor Pipe in your post-war plans.

Specify Naylor Pipe for stock lines, pulp lines, white water lines, hot and cold water lines, condensate lines, exhaust steam lines, compressed air lines, ventilating and pneumatic conveying lines. Sizes from 4" to 30" in diameter—thickness from 14 to 8 gauge—lengths up to 40 feet. All types of fittings, connections and fabrication.

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Continuous production depends, in great measure, upon a smooth, constant flow of materials. When skilled labor is required to move materials manually, much of the efficiency of modern production machinery is wasted. An uncontrolled flow of material can slow down production, too little material can stop it.

A modern, mechanized handling system is necessary to maintain production schedules. Towmotor, the *one-man-gang*, will provide an accurately controlled supply of material, in the right quantities, at the right time and place. The Towmotor DATA FILE tells the complete story—write for it today.

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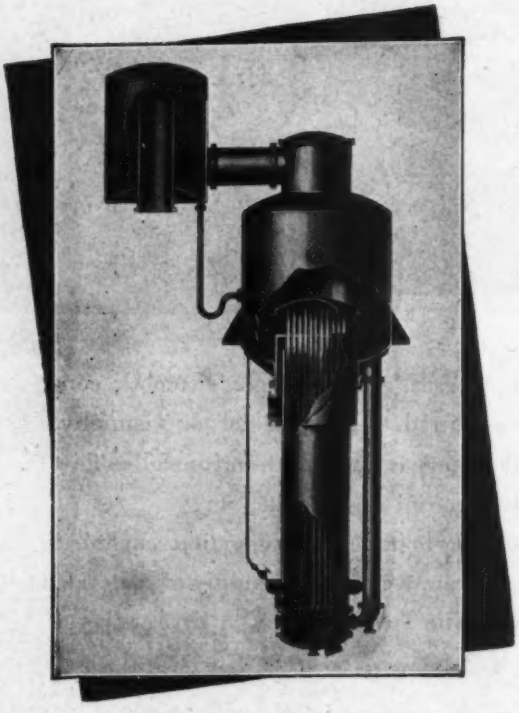

CONKEY EVAPORATORS

Engineers should remember that the features which set new standards of Conkey evaporator performance are those which will assure profitable pulp mill operation, now, or in the post-war period.

Designed by engineers experienced in the various pulp mill processes, they provide for maximum accessibility, minimum entrainment losses, high heat transfer and entirely automatic control. Each unit will give long-time, trouble-free operation with low maintenance and supervision costs.

RECAUSTICIZING PLANTS

All major units — slackers, causticizers, thickeners, filters and lime-burning kilns — are manufactured in our shops. They are engineered and supervised by a staff of engineers and workmen familiar with the problems of recausticizing in Pulp Mills throughout the country. Let us study your problem. This service may result in recommendations which will produce lower operating costs.

name to remember

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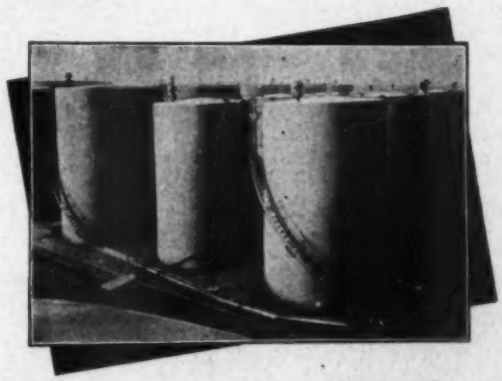
General American's *Plate & Welding Division* at Sharon, Pa., has the experience and the equipment to fabricate anything made of carbon, stainless and alloy steels, Everdur, aluminum and other special alloys, either welded or riveted. It has complete X-ray and heat-treating facilities, stress-relieving furnaces, equipment and laboratories for testing to API-ASME, ASME and other codes, and a large field erection department for either foreign or domestic work.



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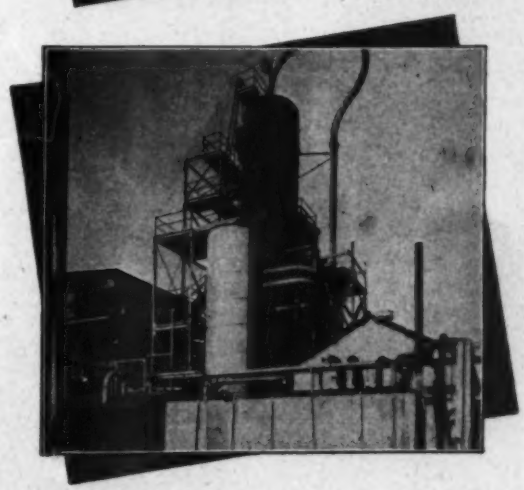

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ASSOCIATIONS

ANNUAL LADIES NIGHT

Each year the Michigan Division of the American Pulp and Paper Mill Superintendents Association holds a Ladies Night Dinner and Dance. Always one of the enjoyable events of the year for this Division, this year it was an especially gala occasion because of the glad news from the war front in Europe.

On Saturday night, May 5, a large party assembled at the Park-American Hotel in Kalamazoo for the cocktail hour which preceded the dinner. The success of this part of the festivities was made possible by a goodly number of the Affiliates Group.

The dinner was held at seven o'clock, and the program which followed was most ably handled by Jack Dickson, of R. T. Vanderbilt Company, as toastmaster. The meeting was strictly informal—there were no speeches—but the master of ceremonies presided with a spontaneity which kept the introduction of distinguished guests and announcements enlivened with repartee.

Introduced to the company were Raymond L. Barton, national president of the Superintendents Association; also three national past presidents: E. T. A. Coughlin (1926), Roy H. Kelly (1932), and Grover Keeth (1943). It being ladies night, the wives of the national president and past presidents were introduced also.

Greetings were read from Stanford Blankinship, past national president (1944), also Edw. J. Thom, of the Howard Smith Paper Mills, Ltd.

During the dinner, and later for dancing, familiar and appropriate music was played by a splendid orchestra.

◆

▶▶▶ PRESIDENT R. M. Fowler, of the Canadian Pulp & Paper Association, has been elected chairman of the Joint Executive Board of the Newsprint Association of Canada and the Canadian Pulp and Paper Association, succeeding Charles Vining, president of the Newsprint Association, who had been chairman of the Joint Executive Board for the 1944-1945 term.

Attending the annual Ladies Night Dinner Dance given by the Michigan Division of the Superintendents Association were the national president of the Association and three past national presidents. Left to Right: Standing—Jack Dickson (R. T. Vanderbilt Co., Inc.), who was the toastmaster of the evening; Raymond L. Barton (Michigan Paper Co.), national president of the Association. Seated—Past presidents of the Association; Roy H. Kelly (Marathon Corp.), E. T. A. Coughlin (Bryant Paper Co.), and Grover Keeth (Marathon Corp.)

◆

TAPPI COMMITTEE MEETS AT PEORIA LABORATORY

The Fibrous Agricultural Residues Committee of the Technical Association of the Pulp and Paper Industry met at the Northern Regional Research Laboratory of the Bureau of Chemistry and Engineering, U. S. Department of Agriculture, Peoria, Illinois, on April 25-26, 1945. S. I. Aronovsky of the Laboratory presided as chairman.

The meeting opened with an address of welcome by H. T. Herrick, director of the Northern Regional Research Laboratory, and was followed by E. C. Lathrop, Head of the Agricultural Residues Division who outlined the pulp and paper program of the Laboratory. This will be reported in detail at a later date. R. G. Macdonald, secretary-treasurer of the Technical Association, discussed "The Role and Importance of Committees in TAPPI."

Following the luncheon, the Committee discussed its problems and organization. As a result, subcommittees were appointed to cover Procurement, Storage and Preservation; Raw Materials Classification; Pulping; Paperboard and Paper Manufacture; and Testing.

Those present were escorted on a tour of the two million dollar laboratory building. This laboratory is devoted to the development of byproducts from cereal straws and a number of other agricultural products. It is here that penicillin manufacture was developed on a commercial basis. A 500 gallon per day capacity alcohol plant is a feature of the Laboratory. Work is being done on starch sponges and regenerated fibers from starch and proteins.

The pulp and paper facilities are unusually extensive and of the latest design and construction.

At the banquet at the Pere Marquette Hotel in the evening there were three addresses given. R. C. Macdonald, secretary of TAPPI, talked on "Some Technical Aspects Regarding the Future of Paper Products." H. T. Herrick, director of the Laboratory, discussed the objectives of the Northern Regional Research Laboratory, and R. D. Coghill, head of the Fementation Division of the Laboratory, gave "The Background of Penicillin Production."

a *Must* in Precision Pipe Prefabrication

THE illustrations above depict the installation of Flow Nozzles in pipes of various sizes. This is another phase of shop fabrication involving operations which cannot be satisfactorily performed in the field. Pipe ends must be accurately bored, flow nozzles and holding rings properly located, centered, pinned, and welded. Instrument taps must also be carefully welded into exact position. Such precision fabrication is necessary to definitely assure accurate registering of instruments when the assembly is installed in a functioning system to measure the flow of steam, water, or other fluids.

The prefabrication of safe, accurate, and economical piping involves not only the services of qualified experts in all fabricating operations from engineering to final test, but requires adequate shop facilities and modern equipment as well.

On your next piping job, whether it involves a single unit or a complete system, let our engineers work with you. There is no obligation. Contact our nearest representative or write us direct.

DO MORE THAN BEFORE—BUY EXTRA WAR BONDS

Pittsburgh Piping
AND EQUIPMENT COMPANY
10 Forty-Third Street — Pittsburgh, Penna.

On Thursday, April 28th, the Committee continued its discussion of straw collection and other problems and three papers were presented: S. I. Aronovsky, J. O. Younger, and G. H. Nelson, of the Laboratory, discussed "Agricultural Residue Pulps for Corrugating—Effects of Weathering and Various Cooking Conditions." Messrs. Aronovsky and Younger continued with a paper on "Physical Evaluation of Straw and Other Agricultural Residue Pulps." H. C. Koch's paper on "Paperboard Production Qualities of Cereal Straw" was presented in his absence. Mr. Koch is with the Auglaize Box Board Company, St. Marys, Ohio.

A demonstration of the Northern Laboratory pulping, washing, beating, sheet-making, and testing techniques was given by the staff.

The following subcommittees and chairmen were appointed: Procurement, Storage and Preservation—H. M. Blandin, Central Fibre Products Company, Quincy, Ill.; Raw Materials Classification—S. I. Aronovsky, Northern Regional Research Laboratory, Peoria; Pulping—R. A. Diehm, Container Corporation of America, Chicago; Paper and Paperboard—Fritz B. Grunwald, Consolidated Paper Company, Monroe, Michigan; and Testing—N. F. Wilson, Alton Box Board Company, E. Alton, Illinois.

Those present included: H. M. Blandin, V. E. Bush, Dr. Ralph T. K. Cornwell, R. A. Diehm, L. F. Dixon, W. W. Galloway, Fritz B. Grunwald, M. F. Knack, H. Lamb, John R. Little, R. M. Morris, Jr., Ernest O'Connor, O. F. Olsen, H. L. Rammer, E. B. Roberts, E. T. Street, John Traquair, S. D. Wells, Norval F. Wilson, J. L. Hayes, A. Ewing, R. G. Macdonald, S. I. Aronovsky, E. C. Lathrop, H. T. Herrick and Staff Members Northern Regional Laboratory.

◆

LARGE ATTENDANCE AT APRIL MEETING OF CHICAGO PRO CLUB

The April 16th meeting of the Chicago Professional Paper Group, held during the evening, in the main dining room of the Chicago Bar Association, 29 South La Salle Street, Chicago, was attended by approximately 160 persons. Following the dinner, a technical paper was presented to the group by F. B. Speyer, of the American Resinous Chemicals Corporation, Peabody, Massachusetts. The subject of the paper was "Laminants and Coatings for Papers, Plastic Films, and the Metal Foils." This paper had been prepared originally for presentation at the annual meeting of TAPPI in February which, because of wartime restrictions, was not held. Lantern slides were used by Mr. Speyer to better visualize many of the numerous facts brought out in his formal presentation.

Other representatives of the American Resinous Chemicals Corporation present at the meeting, and each of whom participated in it, were: W. L. Abramowitz, Ray C. Martin, and Samuel Palais.

The numerous questions that were asked of Mr. Speyer and his associates following the paper were indicative of the wide interest in the subject.

◆

FREIGHT DAMAGE SUBJECT OF TALK BEFORE CLUB

At the luncheon meeting of the Chicago Packaging Club on April 24, A. L. Green, special representative of the freight claim division, Association of American Railroads, addressed the meeting, amplifying his talk with slides.

Mr. Green cited figures of roughly $65,000,000 worth of railroad freight damage in 1944. Causes of all types of damage were revealed by the slides, which carried through from individual packaging and wrapping to bar loading practices. Faulty practices by shipper and carrier alike were discussed indiscriminately.

The Club was formed in September, 1944, to bring together and coordinate the many separate factors necessary for proper packaging and shipping.

◆

DATES CHANGED FOR CANADIAN TECHNICAL SEC. SUMMER MEETING

The dates for the 1945 Summer Meeting of the Technical Section of the Canadian Pulp and Paper Association have been changed from June 12, 13 and 14 to June 18, 19, and 20. The meeting will be held at the Chateau Frontenac, Quebec City, P. Q.

The program will include group discussions planned by the following committees:

Alkaline Pulping	Heat and Power
Board	Newsprint
Engineering	Printability
Fine Papers	Waste
Groundwood	Wood Chemistry

The official dinner will be held on Tuesday evening, June 19, and the guest speaker will be R. M. Fowler, recently appointed president of the Canadian Pulp and Paper Association.

Mill visits are programmed for Wednesday morning, June 20, to the following mills:

Anglo-Canadian Pulp & Paper Mills, Ltd., Quebec

Building Products Limited, Pont Rouge

Donnacona Paper Co., Ltd., Donnacona

Ste. Anne Paper Co., Ltd., Beaupre

To assist in planning the program, particularly the mill visits, all those who will be attending are asked to advise the Secretary-Engineer, Technical Section, Canadian Pulp and Paper Association, 3420 University Street, Montreal 2, P. Q. It is requested that a preference be shown as to the mill to be visited.

Non-members of the Technical Section, particularly those employed directly in the pulp and paper industry, are cordially invited to attend this summer meeting. Hotel reservations should be made as early as possible at the Chateau Frontenac, the Clarendon, or the St. Louis hotels.

◆

COMING EVENTS

May 25-26—Joint meeting of the Connecticut Valley Division of the American Pulp and Paper Mill Superintendents Association and the New England Section of TAPPI, Norwich Inn., Norwich, Conn.

June 1—Northwest Division of the American Pulp and Paper Mill Superintendents Association, at the Conway Hotel, Appleton, Wisconsin.

June 8-9—Brief business meeting and meeting of the Trustees of the American Pulp and Paper Mill Superintendents Association, at the Commodore Hotel, New York City. (The annual meeting of the Superintendents Association, originally scheduled for June 5-7 at the Commodore Hotel, has been cancelled.)

June 18-20—Summer meeting of the Technical Section of the Canadian Pulp and Paper Association, at Chateau Frontenac, Quebec City, P. Q.

STATED MEETINGS

Technical Association of the Pulp and Paper Industry

Delaware Valley Section—First Friday of each month at the Engineers' Club, Philadelphia, Pa.

Empire State Section—Second Thursday of each month at the Woodruff Hotel, Watertown, New York.

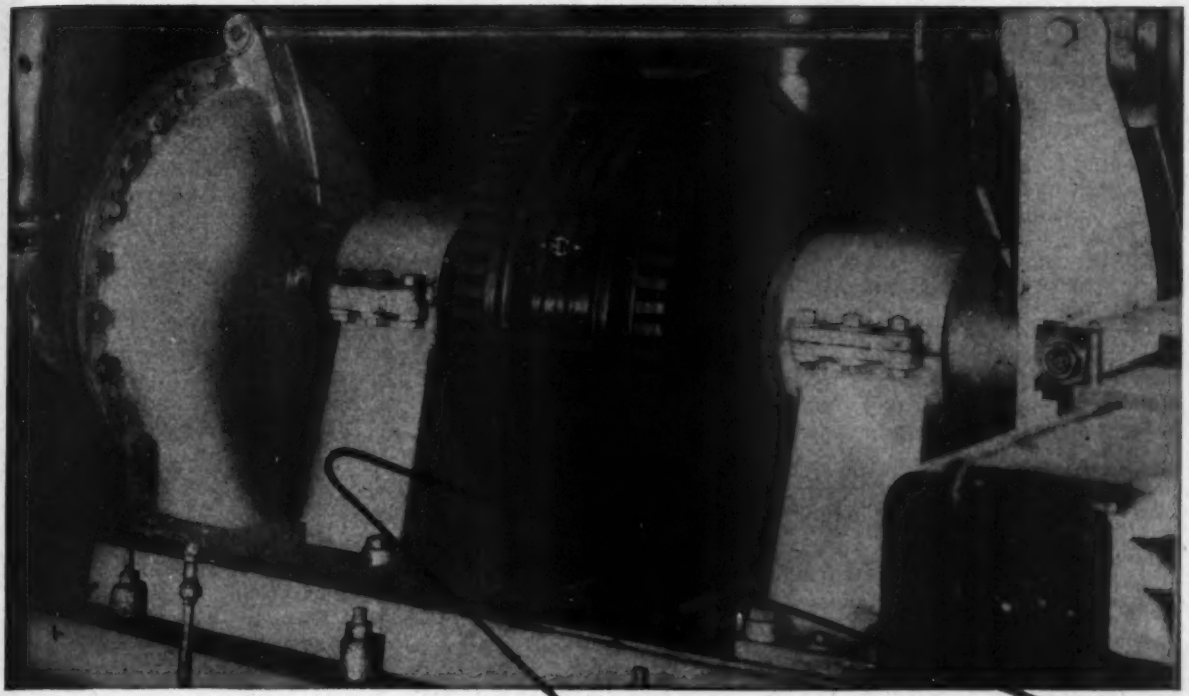
Kalamazoo Valley Section—First Thursday of each month, including June, at 6:30 p. m. at the Columbia Hotel, Kalamazoo, Mich.

Lake States Section — Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

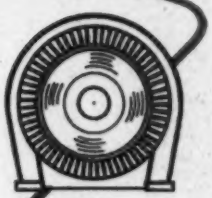
New England Section—Third Friday of each month, at the Roger Smith Hotel, Holyoke, Mass.

Chicago Professional Paper Group

The third Monday of each month at Chicago Bar Association, Chicago.



EVER SEE A "Pigeon-toed" MOTOR?



Well... here is why it's E-Mgineered that way!

TO E-M engineers, who've *specialized* in making built-for-the-job synchronous motors for three decades, a "pigeon-toed" motor is just part of the day's work . . . if that's what is *best* for the job. And this is why E-M engineers built the above motor with its stator feet "toed-in".

As the photo shows, space for the motor base is restricted. This is because the drive . . . a defibrator for grinding raw chips to pulp . . . was initially designed for belted motor drive.

A direct-connected synchronous motor offered such outstanding advantages—with constant speed, improved efficiency and low maintenance—that E-M engineers were asked to build one to fit the existing defibrator base.

The result is the compact, modern drive you see above . . . with a 250 hp, 600 rpm synchronous motor that's *built to meet the job requirements exactly!*

You, too, can get the many advantages of E-M*gineering* . . . it's based on years of cumulative experience in designing and applying synchronous motors correctly . . . by calling an E-M field engineer on your next drive problem.

Write us today for **"ABC of Synchronous Motors"**

ELECTRIC MACHINERY
MANUFACTURING COMPANY
MINNEAPOLIS 13, MINNESOTA

A2013

SAFETY

WIRE ROPE SLINGS NOW REGISTERED FOR SAFETY

American Chain and Cable Company, Inc., Bridgeport, Conn., has recently announced on behalf of its two wire rope divisions, the American Cable Division and the Hazard Wire Rope Division, that their several types of wire rope slings may now be accompanied by a Certificate of Test and Registry for the benefit of the sling user. The policy of selling *registered* slings is new to the entire wire rope industry.

There are several user advantages resulting from this registered service. All registered slings are made from Preformed wire rope of improved plow steel. All registered sling terminals develop the full strength of the sling body. Many registered slings will carry the new ACCO-LOC Safety Splice. The ACCO Certificate of Test and Registry furnishes a permanent record of the original strength rating of the sling, the safety factor upon which that rating was based, the actual proof load, and conditions of the sale. Each sling carries a metal tag which shows registry number, sling type and maximum load rating.

This registered program includes all of the following types of wire rope slings—the conventional wire rope slings, braided wire rope slings and cable-laid slings. ACCO Registered slings are made with ACCO-LOC Safety Splice, Armored Loop, ACCO-U Loc, Tru-Loc and Socket Terminals. All these terminals develop 100 per cent of the rated wire rope strength.

◆

▶▶▶ A CERTIFICATE FOR safety accomplishment was recently awarded to the Brown Company, Berlin, New Hampshire, for a 48 per cent reduction in the number of accidents in the various departments during the past six months. The presentation was made by Lewis E. MacBrayne, representing Secretary of Labor Frances M. Perkins.

◆

▶▶▶ THE NATIONAL SECURITY award, official Civilian Defense citation, has been awarded to the Passaic (New Jersey) plant of The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc. This is the first such award to be received by any plant in the Passaic area and was given to the Manhattan plant for its defense work which was carried to a high degree of efficiency.

◆

▶▶▶ THE SAFETY RECORD for 1944 given out by the United States Rubber Company shows that its plants operated more than 150 million man-hours with an over-all average of only 6.14 lost-time accidents per million man-hours worked. This rate, approximately one-third the average rate of 87 manufacturing industries, established the operations of the company as one of the safest in the country.

◆

SAFETY SCORES

▶▶▶ PERFECT SCORES are recorded for ten mills at the close of March, the tenth month in the 1944-45 Paper Industry Safety Contest. The following list of mills have a perfect record:

Division I—Pulp and Paper Mills

Groups A and B (None)

Group C

Container Corp. of America, Carthage, Ind.

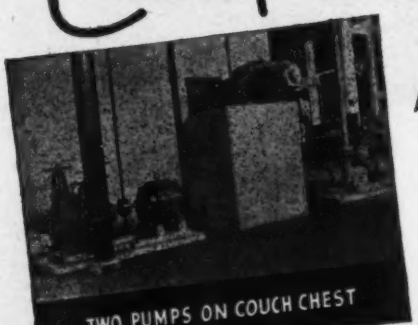
Grade D

Marathon Corp. (Ashland Div.)
Strathmore Paper Co. (Woronoco Mill No. 1), West Springfield, Mass.
Certain-teed Product Corp., Buffalo.
Central Fiber Products Co., Denver.
E. I. du Pont de Nemours & Co., Newhall, Wilmington, Del.

Division II—Paper and Board Remanufacturing

Ft. Wayne Corr. Paper Co., Chicago.
Bird & Son, Inc. (Roofing Plant), Shreveport, La.
Iowa Fibre Box Co., Keokuk, Iowa.
Bay West Paper Co., Green Bay, Wis.

Check with Warren for SUCH SERVICES AS:



Black Liquor
Bleached Liquor
White Water
Showers
Boiler Feed
Green Liquor
Stock — thick and thin
Wash water — hot and cold
Caustic

Why Warren? Because Warren Paper Mill Pumps not only stay with their jobs and protect against costly service interruptions, but they handle their jobs, year after year, at consistently low operating and maintenance costs.

FOR ALL PAPER MILL REQUIREMENTS, SPECIFY:

WARREN PUMPS

ARMY E NAVY

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS

—throughout the **PAPER INDUSTRY...**

Diamond

ALKALI

- SODA ASH
- CAUSTIC SODA
- LIQUID CHLORINE
- SILICATE OF SODA

DIAMOND ALKALI COMPANY

PITTSBURGH, PA., *and Everywhere*

NAMES *in the* NEWS

Personals

INSTITUTE APPOINTS DR. GEOFFREY BEALL AS STAFF STATISTICIAN

The Institute of Paper Chemistry, through its executive director, Westbrook Steele, has announced the appointment of Dr. Geoffrey Beall as Staff Statistician. This new work is made necessary because of the expansion of the Institute's activities in many and varied directions.

Dr. Beall will develop the application of statistical principles in the paper industry, not only research-wise, but also as they may relate to the Institute's educational program. His knowledge and experience will be available to the staff and to the member mills of the Institute.

Dr. Beall has an outstanding scholastic background. Since his graduation from the University of British Columbia in 1931, he has carried on both post-graduate work in several universities here and abroad, and has conducted very special work in economics and statistics in several positions. During the past year he has been in the Division of Vital Statistics of the Ontario Department of Health.

◆

▶▶▶ The promotion of *H. G. Wales* from technical director to mill manager is announced by Dunn Sulphite Paper Company, Port Huron, Michigan. Mr. Wales joined the company in 1929 having been with the Brompton Pulp and Paper Company previously. He also had been with Abitibi and the Howard Smith Companies. In his new position, Mr. Wales will have complete charge of all manufacturing and production of the mill.

◆

FREDERIC C. CLARK MOVES HIS OFFICE TO NEW YORK CITY

Frederic C. Clark has just announced that on May 1 he moved his consulting engineering office to 7 Dey Street, New York City. For the past six years his office has been in Waltham, Massachusetts.

Mr. Clark's work pertains largely to improvements in production and quality, reduction in costs, and a general study of processing in the pulp and paper industry. He has had many years' experience in the operation of both pulp and paper mills and, as a result, is able to bring to a client both the practical and the technical knowledge so important in securing economical plant operation. He has also had wide experience in patent cases and in general consulting work related to the technical problems of the industry.

Mr. Clark is one of the early members of TAPPI, having organized and served on many of the committees, the

Frederic C. Clark

board of directors, and as national president. He is a member of the American Pulp and Paper Mill Superintendents Association, Technical Section, Canadian Pulp and Paper Association, The Paper Makers' Association of Great Britain and Ireland, and The Chemists' Club of New York City.

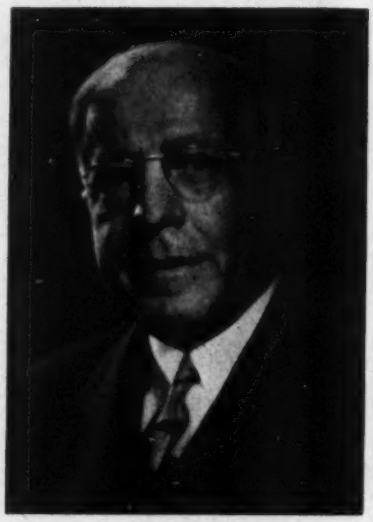
◆

CRANE CO. APPOINTMENTS

P. R. Mork, who has been vice president in charge of sales, as well as a director of the Crane Co., Chicago, since 1941, and has filled many important positions with the company since 1901, has been elected executive vice president. As such, he will act for the president in his absence.

Appointed to succeed Mr. Mork is J. A. Dwyer who likewise has come up from the ranks. His most recent position was general manager of sales and branches.

Lucien W. Moore has been appointed general manager of sales and branch houses, succeeding J. A. Dwyer.

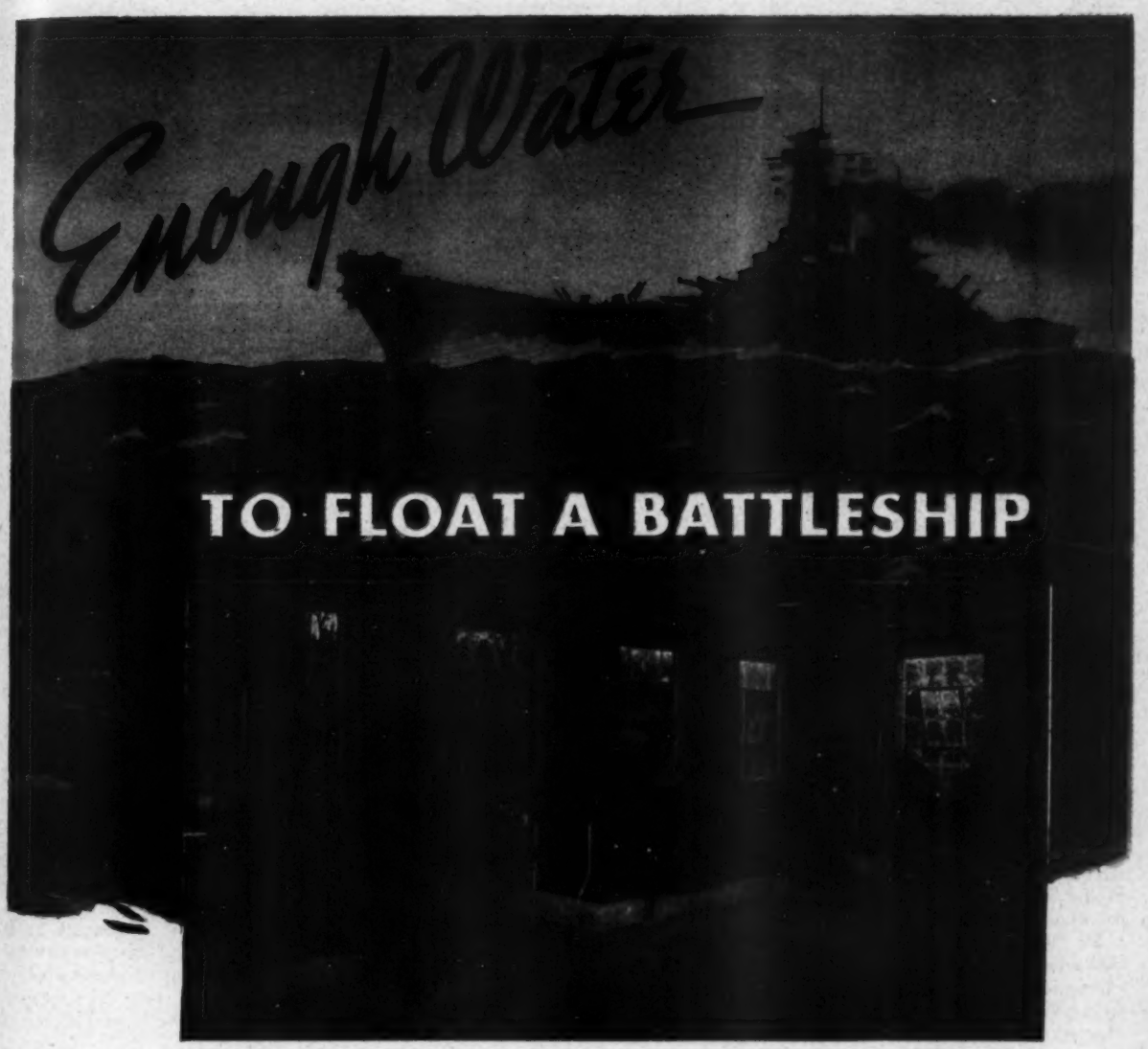


P. R. Mork

F. J. Wilkey, district manager, Chicago, was appointed manager of the valve fitting department, the position occupied by Mr. Moore until his recent assignment in France by the War Department.

J. A. Dwyer

Mr. Moore had served the Crane subsidiary in France as manager of sales, and after his return to the United States in 1940 he was successively manager of pipe sales and general purchasing agent, before his appointment as manager of the valve and fitting department. He will assume his new duties on completion of his present special mission for the Government.



It takes a lot of water to make 100 tons of paper—as much as 40,000 tons—sometimes even more. Practically all of this water must be handled by pumps, some of it many times over, some of it as clear water and some of it mixed with paper stock or other materials.

Ingersoll-Rand has a centrifugal pump for every pulp and paper mill pumping service. Simple cast-iron, bronze fitted units when these do the job effectively and units of special materials or special design when such pumps are essential to more economical operation.

Ask the Ingersoll-Rand engineer for complete details. Also ask him for a copy of bulletin 7022 on I-R pumps for pulp and paper mill service. Ingersoll-Rand Company, Cameron Pump Division, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

10-614

CENTRIFUGAL PUMPS COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS

HENRY C. ATKINS NOW ADVANCED TO A VICE PRESIDENCY

The board of directors of E. C. Atkins and Company, Indianapolis, Indiana, announces the election of Henry C. Atkins to the office of vice president in charge of manufacturing. The appointment of William E. McCartney as superintendent was also announced at the same time.

Mr. Atkins has served the Company for 23 years. He has worked through the various phases of manufacturing and factory management, having been superintendent for the past nine years. He has been associated with government work in Washington. Prior to the creation of the War Manpower Commission he was a member of the State Labor Supply Committee. Mr. Atkins is the third generation of the family actively engaged in the management of company.

Mr. McCartney has been with the company 14 years. He has had an extensive technical training and has come up through the ranks.

◆

GRANT RICHARDSON OF HAMMERMILL NOW SERVING WITH FOREST PRODS. BUR.

Grant Richardson, of Hammermill Paper Company, Erie, Pennsylvania, has been appointed assistant to the director of the Paper Division, Forest Products Bureau, WPB, and already has assumed his duties in Washington.

Mr. Richardson takes with him a background of more than 30 years of experience in paper manufacture and selling. For several years, he has been district manager for the eastern territory and export manager for both Hammermill Paper Company and Grays Harbor Pulp and Paper Company, Hoquiam, Washington. Mr. Richardson has been serving also as a member of the Paper Advisory Board of the Foreign Economic Administration in Washington.

◆

WESLEY CORBIN LEAVES SCOTT PAPER CO.—NOW WITH FRANCIS CHILSON

From the position of assistant director of mechanical development for the Scott Paper Company, Chester, Pennsylvania, Wesley S. Corbin has become associated with Francis Chilson, industrial consultant, New York City.

In his new position, Mr. Corbin will specialize in the paper and packaging field. An announcement from the Chilson offices, simultaneous with that of Mr. Corbin's appointment, states that research offices have been opened by Chilson in the Harwood Building, Scarsdale, New York. The main offices remain at 101 West 31st Street, New York City. The suburban location was decided upon because of the cleanliness and quiet offered which will be advantageous since Chilson specializes in the consumer packaging industries such as food, drug, chemical, cosmetic, and paper industries.

Mr. Corbin was with the Scott Paper Company since 1931. He had worked with all phases of papermaking, from the wood's operation through the pulp mills, paper mills, and converting mills. He also had been instrumental in the development of several new machines now being built on a commercial basis for the continuous rewinding, wrapping, and packaging of tissues and towels.

Henry C. Atkins

Wm. E. McCartney

Wesley Corbin

◆

H. K. PORTER APPOINTS COMSTOCK DIRECTOR OF RESEARCH AND METALLURGY

Director of research and metallurgy for all of its divisions is the appointment given to John A. Comstock by H. K. Porter Company, Inc., Pittsburgh.

Mr. Comstock will be in charge of the central research and testing laboratory located in Pittsburgh. Individual laboratories for plant control will be located at McKeesport (Pa.), Newark (N. J.), and Mt. Vernon (Ill.). While Mr. Comstock will maintain technical advisory service for customers on materials and metallurgy, his prime purpose is to develop new and improved products in the varied Porter lines.

Mr. Comstock has had a number of years of technical and administrative experience with several nationally known manufacturing companies and public utilities. He holds a B.S. degree in metallurgy and engineering from the University of Illinois.

◆

WESTINGHOUSE MAKES ANNOUNCEMENT OF PERSONNEL CHANGES

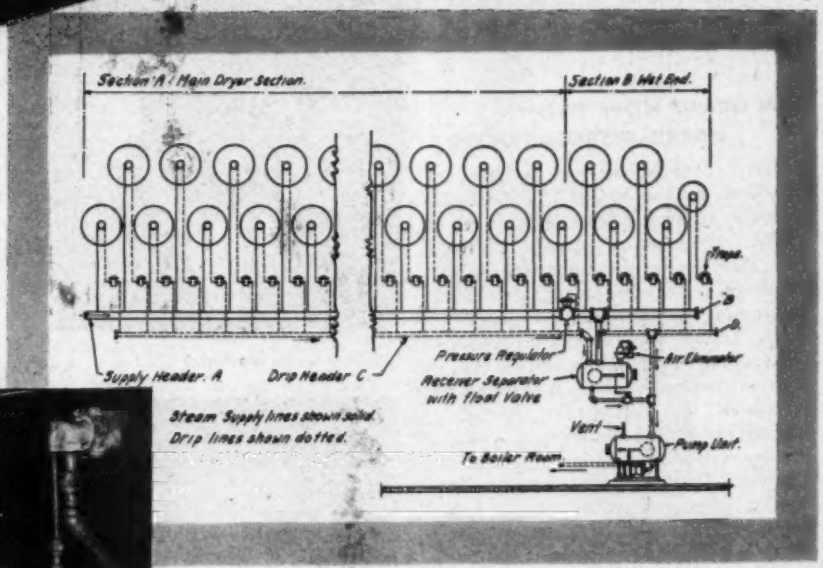
Personnel changes recently announced by Westinghouse Electric Corporation are:

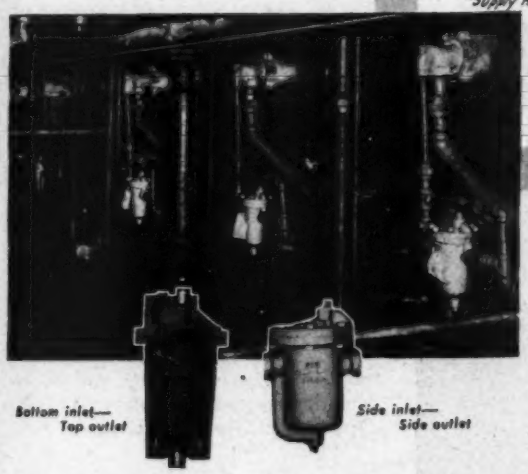
George G. Main, who has been with the company since 1926, has been made assistant treasurer and assistant secretary. He will also assume responsbiility as the company's credit manager.

Charles E. Young, former supervisor of Economic Research, has been appointed manager of the newly-created Statistical Research Department. In

MORE UNIFORM PAPER DRYING

now possible through Individual Control of each dryer!





Armstrong provides a complete line of steam traps admirably suited to all requirements of paper mills. High capacity, compact design, ability to discharge air along with condensate, ability to discharge all ordinary dirt and scale without clogging, freedom from wire-drawing, stainless steel bucket and valve lever, chrome steel valve and seat (hardened, ground and lapped), choice of body styles — These are features that make Armstrong Traps popular with engineers who like trouble-free equipment. Available for pressures up to 2400 psi., capacities to 300,000 lbs. per hour.

For data, prices, capacities, material on condensate drainage practice, maintenance, trouble-shooting write for 36 page STEAM TRAP BOOK.

IF THERE ARE marked variations in individual dryer temperatures in the main drying section of your machine or if dryer temperatures are not up to maximum temperature possible with the steam pressure being used, it will be worth your while to check the benefits of an Armstrong Dryer Drainage System. Only if you have efficient drying can you realize full production and full return on the mill investment.

The Armstrong System is based upon an *individual steam trap for each dryer.* THEY ARE NOT STANDARD TRAPS. They were designed *solely* for dryer drainage service. The entire success of the system depends upon this.

The Armstrong System includes these advantages:

- Removes all *air* as well as condensate. (20% air in a dryer at 10 psi. will reduce temperature 12° F.)
- Provides maximum temperature for all dryers on the machine.
- Does not waste steam nor upset heat balance of the mill.
- Permits desired variation in steam pressure on any section of the machine by adjustment of steam control valve only.
- Completely automatic and quickly responsive to pressure changes.

For a more thorough discussion of this subject, write for "OBSERVATIONS ON DRYER DRAINAGE SYSTEMS".

ARMSTRONG MACHINE WORKS

816 Hoffmann Street, Three Rivers, Michigan

Inverted Bucket Steam Traps for Every Paper Mill Requirement

Dryer Drainage System Trapping and Engineering

his new position, Mr. Young will direct investigations into business conditions, and study relations of such general trends to company activities. The Statistical Research Department also will co-operate with headquarters accounting, market research, and statistical departments so as to avoid duplication of effort, and to apply all available information in its studies.

◆

DON GRANT NOW WITH HARRIS-SEYBOLD-POTTER

Harris - Seybold - Potter Company, Cleveland, announces that Don Grant, formerly superintendent of a well-known lithographing plant in New York, has just become associated with its Chemical Division to engage in research and sales program planning.

Mr. Grant possesses an extensive background in offset lithography. In addition to many years of practical experience in lithography, he has studied electronics for several years, and has written materail for the Lithographic Technical Foundation and taught photography in the lithographic courses given at the New York Trade School.

◆

▶▶▶ *E. T. Frankenhoff,* vice president of the Dicalite Company, has moved his headquarters from Chicago to Los Angeles. He has been connected with the company from its organization as manager of the Central Division. *A. G. Frankenhoff,* who has been vice president and general manager of the company since the first of the year, will continue to make his headquarters in the New York office of the company.

◆

COL. H. WYATT JOHNSTON NOW CAN. REPRESENTATIVE SUTHERLAND REFINER, LTD.

Sutherland Refiner Ltd. has announced the appointment of Col. H. Wyatt Johnston as its Canadian representative, with offices at 319 Drummond Building, Montreal, Canada.

Colonel Johnston is widely known both in the pulp and paper industry and in military circles. He is a graduate in chemical engineering from McGill University and received his Ph.D. for a thesis on penetration of wood by cooking liquors. He has been associated with the Pulp and Paper Division of the Forest Products Laboratories of Canada in Montreal. He went into the Service in 1940, and upon his return to civilian life in 1944 he rejoined the Pulp and Paper Research Institute of Canada as a research associate.

Don Grant

E. T. Frankenhoff

A. G. Frankenhoff

▶▶▶ The appointment of *Frank Colker* and *Thomas F. Maloney* as district sales representatives for the Detroit area has been announced by Towmotor Corporation, Cleveland. Mr. Maloney's address is 604 Fisher Building, Detroit. He is well known as a manufacturers' agent for automotive products.

◆

▶▶▶ Announcement is made by *Dr. Johan Bjorksten,* consulting industrial research chemist, that his laboratories will occupy new and larger quarters at 185 N. Wabash Avenue, Chicago, the same address as before.

◆

▶▶▶ An announcement from A. O. Smith Corporation, Milwaukee, Wisconsin, states that *Lloyd B. Smith,* son of the late L. R. Smith, for many years chairman of the board, has been elected vice president and member of the board. Morris J. Vollmer, former assistant to the president, was named assistant secretary and assistant treasurer, and A. von Wening, vice president and controller, was elected to the board.

◆

▶▶▶ The Container Corporation of America, Chicago, announces that *James A. Cunningham,* for years active in important positions in the utility field, is joining that organization in the capacity of vice president in charge of financial and various administrative matters. He will be located at the executive offices, 111 W. Washington Street, Chicago.

◆

▶▶▶ *John Paul Aprea,* recently discharged from the Armed Forces, has been appointed to the position of advertising and public relations director of the Eutectic Welding Alloys Company, New York City. He will maintain his headquarters at the company's home office, 40 Worth Street, New York 13, N. Y.

◆

▶▶▶ The Controllers Institute of America announces that *Leo J. Thomas,* controller of the Blandin Paper Company, Grand Rapids, Minnesota, has been elected to membership in that group.

◆

▶▶▶ A new member of the staff of the American Standards Association is *Hendry Lars Bart,* formerly managing editor of a number of aeronautical and technical magazines. Mr. Bart is designated as director of public relations to interpret the expanding activities of the ASA in relation to the various industrial and governmental groups associated with it.

1000 POUNDS OF STAINLESS ENDURANCE CAST BY *Cooper*

This blow-valve body is but one example of a superior stainless casting service available to sulphite mills—from Cooper. A casting service that includes standard analyses, or special compositions; heat-treatment and Densicast castings. A service that produces sound corrosion-resistant castings for upper sleeves, covers, strainers and bottom sleeves for digesters; flanges, flanged fittings and valves for general use. All are made with the invaluable experience gained in the special requirements of sulphite-mill service since 1928.

THE COOPER ALLOY FOUNDRY CO.
125 BLOY ST., HILLSIDE N.J.

THE ONLY ALLOY FOUNDRY WITH ALL THESE FACILITIES

- Laboratory control over raw materials and finished products.
- Dual foundry . . . both hand and machine molding.
- Electric arc and high-frequency-induction melting furnaces.
- Centrifugally-cast castings.
- Heat treating of Castings up to six feet.
- X-ray and Gamma-ray Inspection.
- Precision Castings.
- Machine shop . . . specially equipped for finishing stainless steel.
- Improved cleaning . . . including Lustracast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.
- Zygio detection of surface imperfections.

THE [illegible] ALLOY FOUNDRY CO.
STAINLESS • MONEL • NICKEL

ST. REGIS APPOINTMENTS

The election of C. R. Mahaney as vice president and the appointment of Charles A. Brothman as comptroller of the St. Regis Paper Company has been announced by R. K. Ferguson, president.

Mr. Mahaney has served as general manager of the Panelyte Division of St. Regis for the past ten years. Mr. Brothman will retain his present position as treasurer of the Skenandoa Rayon Corporation, St. Regis subsidiary.

◆

F. E. HUFFORD BECOMES TRAFFIC MGR. OF M AND O

After 28 years with the company, R. J. Henderson has retired as traffic manager of the Minnesota and Ontario Paper Company and its subsidiaries. Appointed to succeed him is Franklin E. Hufford of Washington, D. C.

Mr. Hufford comes to Minneapolis with a varied experience in the field of traffic, and his most recent work was with the Forest Products Bureau of the WPB in Washington in the capacity of transportation consultant. In this work he handled transportation matters for the pulp, pulpwood, paper and paperboard division of WPB.

◆

A. L. BERGSTROM NOW A VICE PRESIDENT OF TIMKEN

At a meeting of the board of The Timken Roller Bearing Company, Canton, Ohio, Albert L. Bergstrom, executive engineer of the company, was elected vice president of all engineering.

Mr. Bergstrom came to this country from his native country, Sweden, in 1924. He is a graduate of the Royal Technical Institute in Stockholm. His first position in the States was that of designing engineer for the Stearns Conveyor Company, of Cleveland. He left that position in 1929 to become associated with Timken as development engineer. Until his appointment as executive engineer in 1938, he was given various engineering and development assignments.

◆

DR. C. A. THOMAS MADE A VICE PRESIDENT OF MONSANTO CHEMICAL CO.

The election of Dr. Charles Allen Thomas, director of the Central Research Laboratories of Monsanto Chemical Company at Dayton, Ohio, as a vice president of the company, has been announced. Dr. Thomas also will become a member of the company's executive committee. He has been a member of the board since 1942. Dr. Thomas will make his headquarters at the head offices of the company in St. Louis. He is being succeeded at Dayton by Dr. Carroll A. Hochwalt, formerly associate director of the Central Research organization.

C. R. Mahaney

I. G. Stewart

Dr. Charles A. Thomas

◆

CORNING GLASS WORKS ADVANCES THREE EMPLOYEES

Three employees of Corning Glass Works, Corning, New York, have won recognition from the company according to organization changes just announced.

Edward C. Leibig, production manager of the technical products division, has been promoted to the position of assistant to the director of glass technology, Vice President William C. Taylor.

Justin J. Pfeiffer, manager of the company's Central Falls (R. I.) plant, has been advanced to manager of manufacturing for the Technical Product Division.

D. Kenneth Shaddock, production superintendent of the Central Falls plant, succeeds Mr. Pfeiffer as plant manager.

◆

SAN FRANCISCO SALES OFFICE OPENED BY THE COLUMBIA CHEMICAL DIV.

A new district sales office has been opened in San Francisco by Columbia Chemical Division of the Pittsburgh Plate Glass Company. This office will be devoted only to the sale of heavy chemicals and was installed because of the increasing importance of West Coast activities. It will also serve buyers of heavy chemicals on the West Coast, and follows the acquisition of the Pacific Alkali Company, Bartlett, California, by the Columbia Chemical Division.

I. G. Stewart, who has had 22 years of experience in the heavy chemical field, has been appointed manager.

◆

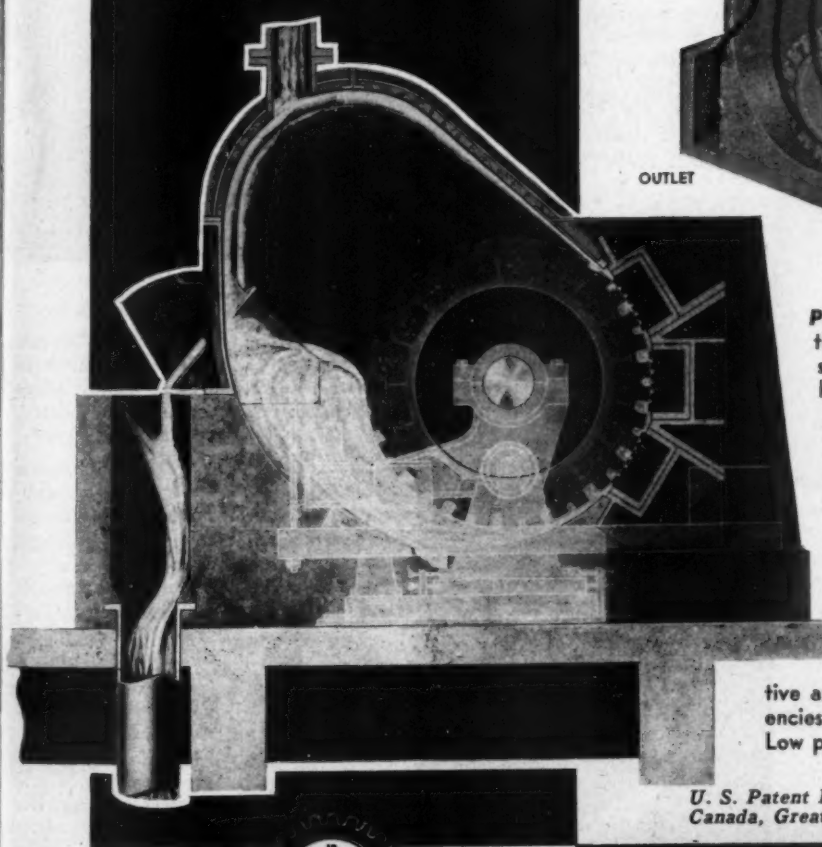
RUSSELL LANG HAS JOINED STAFF OF HALL LABORATORIES

Hagan Corporation, Hall Laboratories and Calgon, Inc., recently announced that Russell Lang, formerly engaged in water chemistry in the paper field, has joined the Hall Laboratories field service staff at Los Angeles, under Ray Sullivan. He will devote his principal efforts to boiler water conditioning aboard merchant marine vessels.

Mr. Lang is a graduate of the New York College of Forestry, Syracuse,

The ROLL-O-FINER

Positive Fibre Treatment... Continuous, High Density Beating



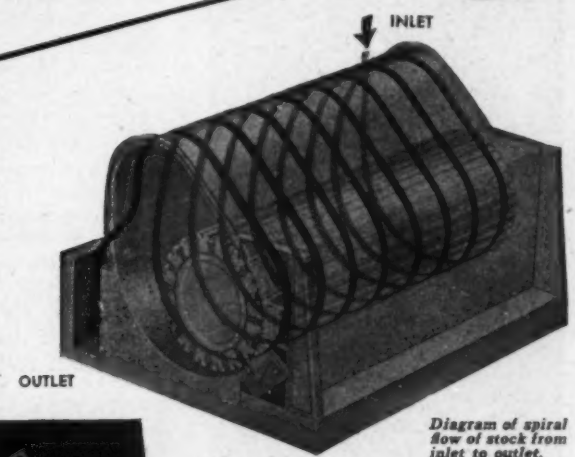


Diagram of spiral flow of stock from inlet to outlet.

Positive Fibre Treatment—The continuous, progressive, recycling of the stock the full length of roll results in highly efficient treatment of all fibres.

Continuous Beating—Ideal for continuous beating of all stocks. Streamline design of stock chamber insures good circulation of stock up to 8% consistency. Installed in series allows any desired amount of stock treatment. Basalt Lava stone treatment provides high strength.

Advantages — Controlled pressure. Positive and uniform circulation. High consistencies. Uniform refining. Large capacity. Low power. Bedplate accessibility.

•

U. S. Patent No. 2,360,854 — Mexico 43,184. Canada, Great Britain and Sweden pending.

PIA INC

Write for Roll-O-Finer Bulletin

PAPER and INDUSTRIAL APPLIANCES
Incorporated
122 East 42nd Street, New York, N. Y.

N. Y., where he completed his courses in 1936. He became associated with the Ault & Wiborg Corporation, Cincinnati, where he worked on paper coatings. Subsequently, in 1939, he worked with Calgon, Inc., on paper problems involving water, his work being carried on at the university in Syracuse, joining the Pittsburgh staff in 1943. He is a member of the Technical Association of the Pulp and Paper Industry.

◆

▶▶▶ The American Manganese Steel Division of the American Brake Shoe Company, Chicago Heights, Illinois, has advanced *J. L. Mullin* from gen-

J. L. Mullin

eral superintendent of foundries to vice president in charge of operation. He will carry on his new duties from the Amsco headquarters at Chciago Heights, Illinois.

◆

▶▶▶ The many friends of *George Boschen*, who resigned as assistant to Thomas J. Burke, secretary-treasurer of the Sulphite Paper Manufacturers Association, Inc., to go into the Army, will be pleased to learn that he recently received his commission as a lieutenant, according to advices recently received by Mr. Burke from Germany. Lt. Boschen wishes to be remembered to his many friends in the paper industry.

◆

▶▶▶ From general assistant manager to manager of the cellophane division of E. I. du Pont de Nemours & Company, Wilmington, Delaware, is the promotion given recently to *Thomas L. Hines*. Mr. Hines succeeds the late John E. Hatt. He has been with the Du Pont Company since 1915.

▶▶▶ *J. H. Henshaw* has been appointed general export manager of the Pittsburgh Plate Glass Company. He has been serving as the company's assistant manager of the Boston unit.

◆

R. W. PORTER IS NOW ASSISTANT EDITOR OF CHEM. & MET. MAGAZINE

The appointment of R. W. Porter to the position of assistant editor has just been announced by *Chemical & Metallurgical Engineering*.

For the past two years, Mr. Porter has been in the application engineering division of the Brown Instrument Company, Philadelphia. Prior to that, he spent several years in the mills of the Crown Zellerbach Corporation at Port Townsend, Washington, and Carthage, New York. Mr. Porter is a graduate of the University of Washington, Seattle.

◆

▶▶▶ Two appointments in General Electric Company's Industrial Divisions name *J. J. Huether* assistant manager of the Industrial Divisions and *W. A. Wirene* manager of the Industrial Materials Division, Industrial Divisions. Mr. Huether had been manager of the Industrial Materials Division for eight years, with Mr. Wirene as assistant manager since 1942.

◆

▶▶▶ As of April 30, *Tracy V. Buckwalter*, who for the past twenty-five years has served as chief engineer and vice president of The Timken Roller Bearing Company, Canton, Ohio, retired under the company's retirement annuity plan. The company, however, will retain his services in a consulting capacity.

Tracy V. Buckwalter

▶▶▶ A newly-elected director of the Pejepscot Paper Company, Brunswick, Maine, is *Earl S. Thompson*, who is an official of public utilities and financial organizations. He also is overseer of Bowdoin College, Brunswick, Maine.

◆

▶▶▶ Since 1940, *C. E. Mason* has been associated with the Mason-Neilon Regulator Company as Director of Engineering. Mr. Mason has now terminated that connection to become technical director of the Bristol Company, Waterbury, Connecticut. Prior to his connection with Mason-Neilon, Mr. Mason was associated with the Foxboro Company for 17 years. During

C. E. Mason

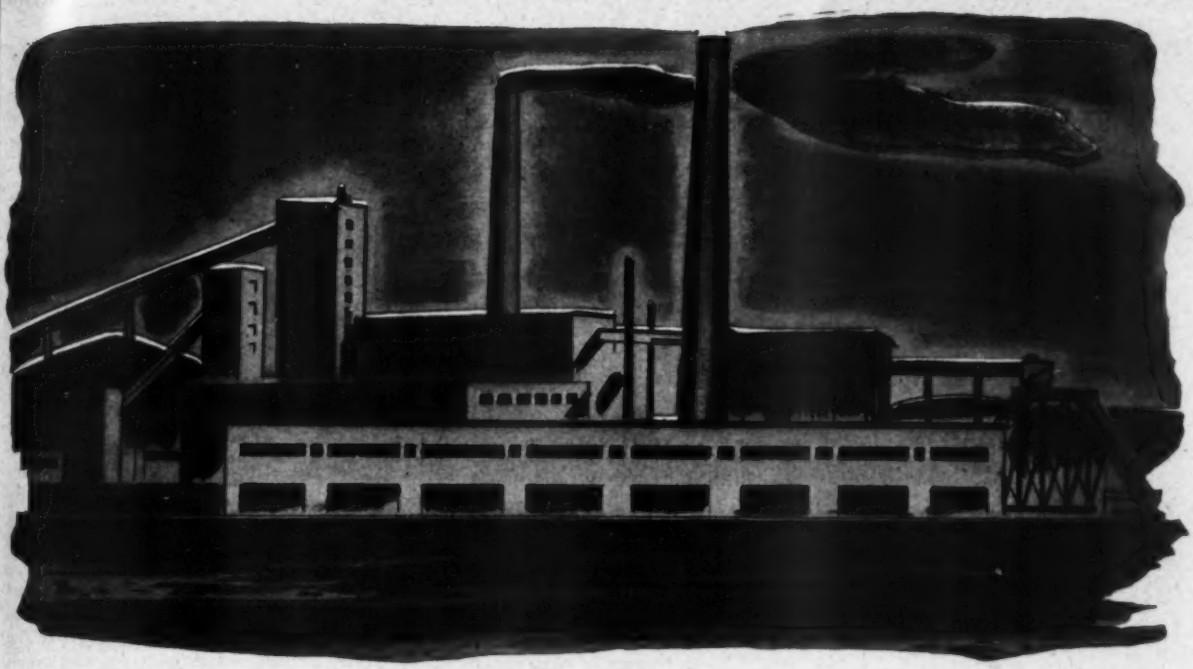
a part of that time he acted as director of control research. He will make his headquarters at the general offices of Bristol Company in Waterbury.

◆

▶▶▶ Well known in automotive circles, *George Spatta*, formerly executive vice president of Clark Equipment Company, Buchanan, Michigan, has been elected president of the company to succeed the late Albert S. Bonner. Mr. Spatta joined the Clark organization in 1927, having previously been with General Electric Company.

◆

▶▶▶ Director of Engineering of Foster D. Snell, Inc., Brooklyn, is the new position recently taken by *David Gordon*, formerly chief engineer for the Interchemcial Corporation. Over a period of more than 20 years, Mr. Gordon has acquired a broad background of experience and responsibility. In his new position, he will have complete responsibility for all engineering projects and will serve as consulting engineer.



WHAT GOES ON IN THIS PAPER MILL...

in addition to making paper?

Many paper mills today are *also* turning out chemical by-products of wood . . . such as tall oil, alcohol, resins, turpentine used in the manufacture of soaps, plastics, paints — to name a few. What new kinds of by-products will be made in paper mills of the future can't be said for sure right now.

What *is* certain is that the processing of chemical by-products calls for the right pumps — often specially-developed pumps — such as Worthington builds now . . . and *will* engineer to solve your future problems.

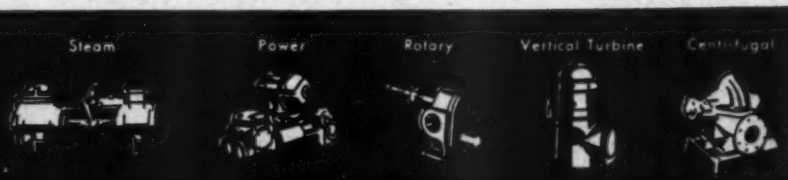
Worthington P.A.E.'s* offer the most in experience and know-how of pump application for all types of pulp and process problems. Worthington offers all types and sizes of centrifugal pumps to *overcome* these corrosion, abrasion, heat viscosity and solidification problems. If you need the right pumps now . . . or will need them after the war, you'll learn that *there's more worth in Worthington* by phoning our nearest office or writing to— *Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

*P.A.E.—Pump Application Engineer.

3 of 6 Worthington thin Black Liquor Pumps in the Diffuser House of the North Carolina Pulp Company, Plymouth, N. C.

WORTHINGTON

THE WORLD'S LARGEST MANUFACTURER OF PUMPS



E. D. JONES & SONS CO. ELECTS NEW PRESIDENT

The E. D. Jones & Sons Company of Pittsfield, Massachusetts, announces with regret that Stanley P Benton, who has been connected with the company since 1918, and who for the past 17 years has been its president, resigned from that office April 16th. He will continue in service as chairman of the board of directors. Mr. Benton is succeeded as President by S. Harley Jones, grandson of the company's founder, and who has since 1938 been vice president, having served in other capacities with the company for 16 years.

The other officers of the corporation remaining unchanged are: H. H. Williams, vice president in charge of sales; D. E. Jones, vice president in charge of manufacturing and engineering; E. E. Dawson, Jr., treasurer; Miss Elizabeth Hill, assistant treasurer; J. I. Donna, secretary.

◆

▶▶▶ A promotion has been conferred upon *S. L. Flugge*, formerly manager of manufacturing research in the research department of Continental Can Company, New York City. Mr. Flugge has just been appointed director of container research, succeeding C. E. Maier, who has been named assistant to Paul E. Pearson, vice president in charge of equipment development and research.

◆

▶▶▶ At the annual meeting of the board of directors, *William T. O'Connor* was elected vice president in charge of purchases of Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut. Mr. O'Connor became associated with MM&M as purchasing agent in 1928 when the company acquired The American Schaeffer & Budenburg Company, with which company he had held the position of purchasing agent.

◆

NEW MINNEAPOLIS SALES REPRESENTATIVE FOR MIXING EQUIPMENT CO.

A new representative, located in Minneapolis, has been announced by Mixing Equipment Company, Inc., Rochester, New York. For the past 12 years the new representative George R. Mellema, has been a manufacturer's agent in the above territory and has specialized on heating and ventilating equipment, steam and mechanical specialties. Prior to operating as a manufacturers' agent, he was employed as engineer by a Minnesota firm. His services will be available to those in his territory who need aid on problems of mixing and agitation.

Mr. Mellema will be located at 1024 Plymouth Building, Minneapolis 2, Minnesota, and his territory will include Minnesota, North Dakota, South Dakota, and the extreme western section of Wisconsin.

◆

▶▶▶ The transfer of *Ray E. Madden* to the position of district sales and service representative for the Chicago area has been announced by Towmotor Corporation, Cleveland. For the past ten years, Mr. Madden has been engaged in sales and application engineering of industrial trucks in several eastern and midwestern territories.

Necrology

HERBERT J. BROWN

Herbert J. Brown, who retired in 1935 after serving 30 years as president of the Brown Company, with mills at Berlin, New Hampshire, and La Tuque, Quebec, passed away April 16 at his home in Falmouth Foreside, a suburb of Portland, Maine. He was 83 years of age.

Born in Portland, Mr. Brown was graduated from Phillips - Andover Academy and from Williams College in 1885. Shortly thereafter he began his service with the paper company, which until 1917 was known as the Berlin Mills.

Surviving are his widow, two daughters, and three sons.

◆

▶▶▶ Friends and business acquaintances of Howard L. Cheney, owner of the Cheney Pulp and Paper Company, Franklin, Ohio, will regret to learn of the passing of *Mrs. Cheney* on April 28. Mrs. Cheney was well known in the territory surrounding Franklin. Both Mr. and Mrs. Cheney are noted for their many philanthropic deeds in Franklin, Middletown, and surrounding villages. Besides her husband, Mrs. Cheney is survived by a daughter.

◆

THOMAS S. HODGSON

On April 14, Thomas S. Hodgson, southern district manager of the Union Bag & Paper Corporation, New York, was killed in an airplane accident in West Virginia.

Mr. Hodgson was 42 years old, a native of Chicago. In 1930 he joined the sales organization of the Union Bag & Paper Corporation, and in 1940 he became western sales manager. In 1941, he was transferred to the New York office, and in 1943 he was appointed southern district manager.

He is survived by his widow, a son and a daughter.

◆

HARRY L. DELANDER

A long-time member of the advertising department of Crane Co., Chicago, Harry L. Delander passed away suddenly April 13. Mr. Delander completed 40 years of service with the company in December, 1944. He had filled almost every job in the department as changing conditions altered the company's advertising program. His latest interests were the editorship of *Valve World* and of the company's two internal house organs, one for salesmen and one for Crane men in the Service.

Industrial advertising men will remember Mr. Delander as one of the founders and the first president of the Engineering Advertisers Association in 1919, and an active participant in the launching of the National Industrial Advertisers Association.

◆

▶▶▶ *John Earl Hatt*, manager of the Cellophane Division, E. I. du Pont de Nemours & Company, passed away suddenly April 13 at his home in suburban Greenville, Delaware. He was 65 years of age. His widow and a daughter survive.

◆

ROBERT M. KENNY

Well known in eastern Canadian circles, Robert M. Kenny passed away April 26, at the age of 70. Mr. Kenny was president and manager of the James Maclaren Company, Buckingham, Quebec, and vice president of the Maclaren-Quebec Power Company. He had always been connected with the Maclaren interests and was president of the Maclaren Newsprint Sales, Ltd., and vice president of the Maclaren Power and Paper Company, at Buckingham.

He is survived by his widow, three daughters and two sons. Another son was reported missing at Dieppe.

◆

▶▶▶ *Robert M. Sanford*, manufacturing superintendent of Monsanto Chemical Company's plant at Monsanto, Illinois, passed away April 24 at the age of 56. He had been manufacturing superintendent of the organic departments since 1941, and had been with the company since 1917. Mr. Sanford was a member of the American Chemcial Society, and the American Institute of Chemical Engineers.

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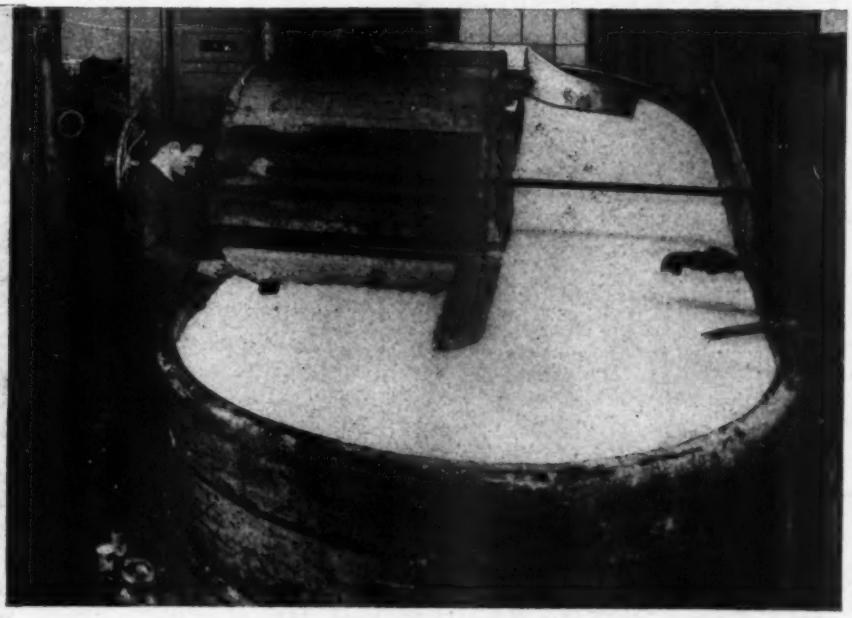
SPECIFY "GENERAL CHEMICAL"

for quality papermaking chemicals

GENERAL CHEMICAL COMPANY
products for the paper industry

- Aluminum Sulfate (Standard and Iron Free)
- Copper Sulfate
- Muriatic Acid (Hydrochloric)
- Sodium Fluoride
- Sodium Silicate
- Sodium Metasilicate
- Glauber's Salt (Crystal or Anhydrous)
- Salt Cake
- Sodium Sulfide
- Sodium Hyposulfite
- Sodium Sulfite (Anhydrous)
- Sodium Bisulfite (Solution or Anhydrous)
- Disodium Phosphate
- Trisodium Phosphate
- Tetrasodium Pyrophosphate
- Sulfuric Acid
- Nitre Cake (Sodium Bisulfate)
- Nitric Acid

BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY



Making quality paper depends to a large extent on the quality of the chemicals used. General Chemical Aluminum Sulfate, for example, either in the Standard or Iron Free grades, will help maintain quality in your paper from the start. General Chemical's carefully controlled production methods insure "Alum" of uniform quality and concentration, and a low percentage of impurities.

Next time, specify these quality General Chemical products for *your plant:*

ALUMINUM SULFATE

Standard—Lump, Ground 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh.

Iron Free—Lump, approx. 2½"; Ground, thru 8 mesh.

SODIUM SILICATE

Solutions: from 38°—60° Baumé

Appearance: Opalescent to clear

Wt. Ratio (Na_2O to SiO_2) from 1:2.00—1:3.40

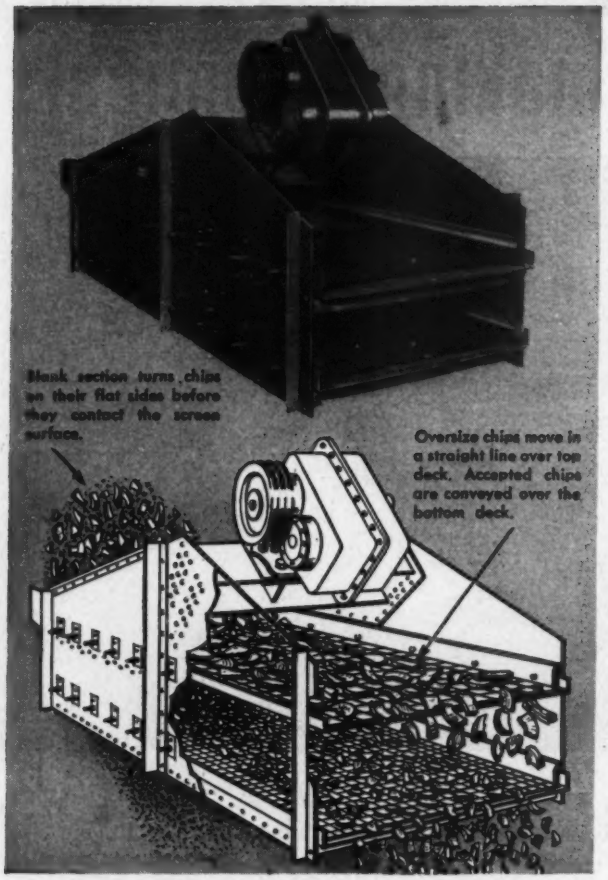
GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

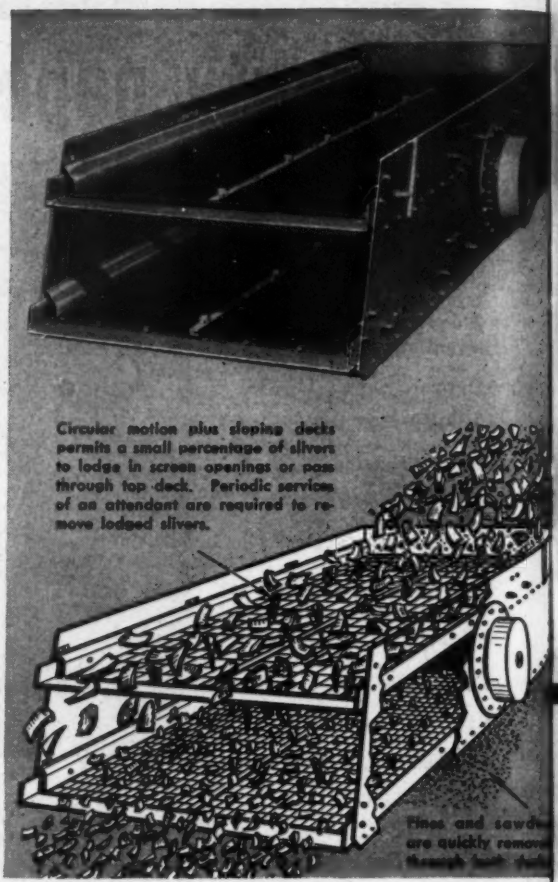
Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

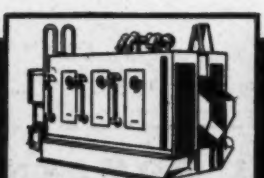
Which Chip Screen is


Blank section turns chips on their flat sides before they contact the screen surface.
Oversize chips move in a straight line over top deck. Accepted chips are conveyed over the bottom deck.

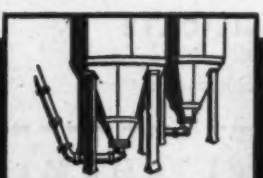

Circular motion plus sloping decks permits a small percentage of slivers to lodge in screen openings or pass through top deck. Periodic services of an attendant are required to remove lodged slivers.

1 THE LOW-HEAD CHIP SCREEN with its *horizontal* decks and 45° straight-line motion gives you the *highest percentage of uniform size chips.* Reason is that all chips are carried in a straight line — *on their sides*—with acceptable chips passing through, rejects and long slivers passing over, the top deck. Low-Head gives you *bigger capacity* than comparable size inclined screens, and *saves manpower* — practically eliminates need for attendant to remove slivers!

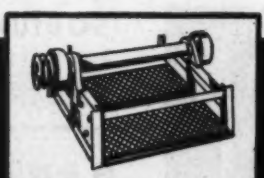
2 THE RIPL-FLO CHIP SCREEN with its 25° *inclined* decks and circular motion gives you an *average percentage of uniform size chips.* For many grades of pulp, Ripl-Flo is a good buy . . . for 3 principal reasons: 1) It does as good or better screening job than *any* inclined screen; 2) It is *lower in initial cost* than most comparable size screens; 3) Has *only 2 bearings* — takes less power, less maintenance than conventional 4-bearing screens!



PREPARATION — Hydraulic Barkers, Chip Screens, Saws, Slashers, Interplane Grinders.



COOKING — Digesters, Blow Tanks, Kilns, Slakers, Heat Exchangers, Condensers.



WET ROOM — vibrating-type screens for use as Thickeners, for dewatering rejects.

PAPER-MAKING — special design Drives for Paper Machines, Rewinders, Calenders.

ALLIS-CHALMERS

is Best for You?

That depends on your particular needs! At Allis-Chalmers you can select from 2 different Screens—each designed to size a different quality of chips!

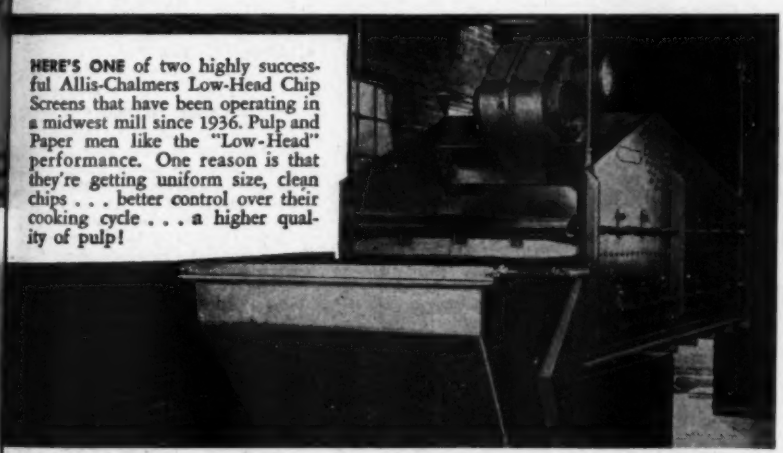
ALTHOUGH most operators agree they'll eventually standardize on *Vibrating-type* Chip Screens, they *don't* agree that *all* such screens will give them comparable results.

For *correct* selection depends on the *individual* mill . . . is based on such factors as: quality of pulp to be produced; type of chippers; available manpower, etc.

That's the reason A-C offers you 2 different types of vibrating Chip Screens . . . wants to know the *complete facts* about *your* particular operation before it makes a recommendation to you!

For helpful, preliminary information on selection and application of Chip Screens, send for Bulletin B6353. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 1851

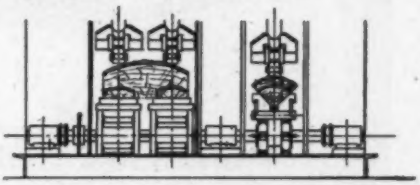


HERE'S ONE of two highly successful Allis-Chalmers Low-Head Chip Screens that have been operating in a midwest mill since 1936. Pulp and Paper men like the "Low-Head" performance. One reason is that they're getting uniform size, clean chips . . . better control over their cooking cycle . . . a higher quality of pulp!

DEVELOPMENT NEWS

THE REVOLUTIONARY PROGRESS being made by the A-C Streambarker, first commercially developed hydraulic barker for pulpwood sticks 4 to 18 inches in diameter, 4 to 8 feet in length, has led to the development of two new Streambarker units—(1) A large Round Log Barker for handling logs 18 to 40 inches in diameter, 16 to 30 feet in length; and (2) A Hydraulic Slab and Edging Barker.

Similar in principle and operation to the original Streambarker, the new units promise: *Complete elimination of brooming losses;* Important *savings in manpower; Lower initial and installation cost* than other types of barking equipment; Valuable mill *space savings;* and a *higher quality end-product.*



This cross-section plan shows how both slabs and quarter-logs will pass through one machine.

STREAMBARKER ROUND LOG BARKER. Water, at 650 lbs pressure, removes bark by erosive action as log is revolved on 4 automatic rollers, and propelled by a carriage which moves back and forth below high pressure water jets.

The carriage is designed to both load and unload at special ramps provided at each end of the barking chamber. When carriage is at one end of travel, automatic lifter arms raise the barked log free of the rollers and onto the unloading ramp. The arms are then in position to receive a rough log and automatically drop it into the crotch of the rollers, which begin rotating the log toward the other end.

One operator, viewing through shatter-proof glass, controls progress of the log. Depending on its diameter, shape and species, he can adjust both height of water nozzles and movement of carriage to assure thorough barking action.

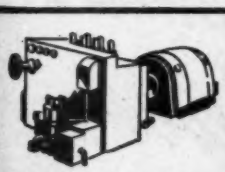
STREAMBARKER SLAB AND EDGING BARKER. Slabs are conveyed through Streambarker on spur-equipped variable speed bed chains. A series of special, spring-controlled, hinged baffle plates holds slabs in position while barking action takes place.

Three oscillating nozzles, operating at 90° to length of slab, are adjustable for length of stroke and speed—assure full coverage of bark surface.

Edgings are fed, 1 or 2 at a time, through a separate channel running the length of the machine.

For further information on A-C Streambarkers, contact our nearby district office, or write to ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WIS.

♪ *Tune in the famous Boston "Pops", Blue Network, Saturdays at 8:30 pm, EWT.*



POWER — all types of Power Generation, Distribution and Control Equipment.

MOTORS & CONTROLS — all types a-c and d-c Motors, ½ to 7000 hp — Gearmotors.

TEXROPE V-BELT DRIVES — fractional to 5000 hp — Constant and Adjustable speed.

PUMPS — Single & Multi-Stage, 10 to 150,000 gpm — Paper Stock Pumps, Fan Pumps.

S MILWAUKEE 1, WIS.

TIGHT VALVES *Save Fuel!*

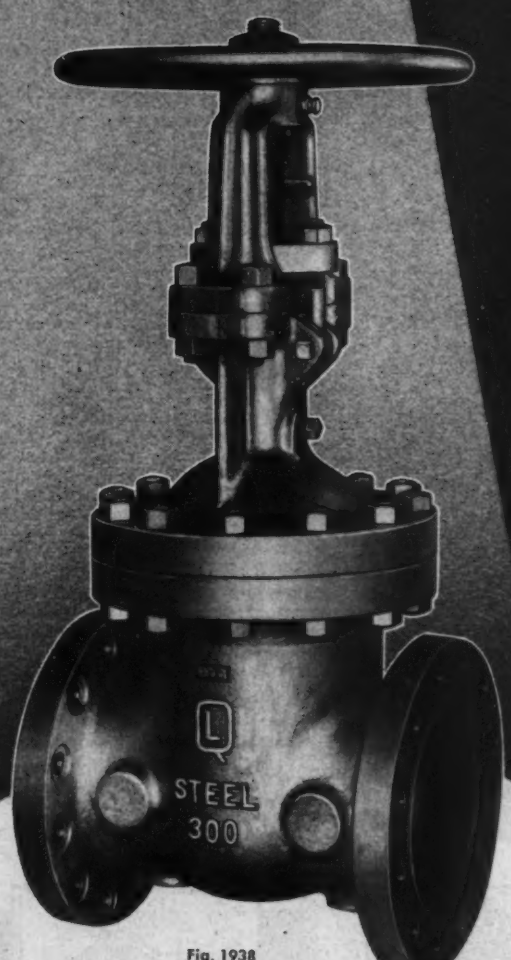


Fig. 1938
Steel Gate

BRONZE, IRON, STEEL, AND CORROSION-RESISTANT ALLOY VALVES—125 to 2500 LB. S. P. . . . BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS.

VITALLY IMPORTANT NOW, WHEN EVERY POUND MUST BE CONSERVED

. . . Many elements in a piping system may contribute to ultimate fuel waste. Insulation may be inadequate. Piping and fittings may be defective. *Or valves may fail to hold tight* . . . resulting in leakage of steam, air, or water, and in lowered pressures, all of which may mean excessive *fuel consumption.*

Lunkenheimer Valves—whether of steel, iron, or bronze—are *quality built* to *stay tight,* over years of service. They afford constant, dependable protection against leakage. Simplicity of design and a minimum of working parts assure extra long life and easy, economical maintenance.

We have prepared a chart, showing in dollars-and-cents figures, what leaky valves can waste in steam, water, and air. For a copy, write The Lunkenheimer Company, Cincinnati 14, Ohio, U. S. A.

"MAN-MADE INFERNO"

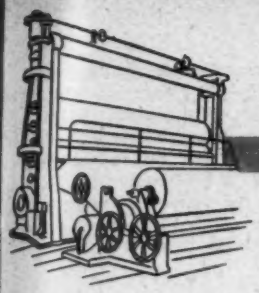
From this huge electric furnace, large quantities of molten steel are poured daily, for use in making castings for Lunkenheimer Steel Gate Valves . . . Only laboratory OK'd metals are used; formulae are rigidly adhered to; weighing is very accurately done. Heating and pouring temperatures are carefully controlled and checked. Every aid of science is used to produce metal that will uphold Lunkenheimer's reputation for fine castings.

Lunkenheimer Valves

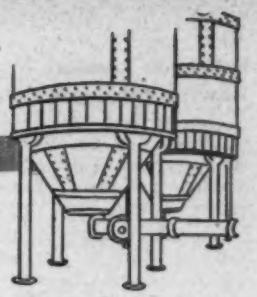
Branch Offices:
New York 13 Chicago 6
Boston 10 Philadelphia 7

Export Department:
318-322 Hudson St.,
New York 13, New York

The Lunkenheimer Nationwide Distributor Organization is always ready to help you with your problems of operation and maintenance. There is one near you with facilities for complete service.



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Increasing Visibility of Power Truck

A simple but effective method for increasing the visibility of mobile equipment in a pulp or paper mill is to stripe paint such equipment with contrasting colors.

Luminous paint has been suggested and applied in some instances to trucks used in dim light and hazy atmospheres.

The illustration shows a fork type truck in a paper manufacturing plant. Note how the contrasting color of bars enhances visibility. — THE ELWELL-PARKER ELECTRIC COMPANY.

◆

Care of Portable Electric Tool Motors

Portable electric tool motors should be blown out frequently with compressed air to remove dust and dirt which might accumulate and clog air vents. In addition, tools should be dismantled occasionally and cleaned thoroughly by washing, brushing and drying all parts. A clean tool will get proper ventilation around the motor windings and will, therefore, run cooler.

Overloading, with its severe strain on gears, bearings and particularly on the motor, is the most common cause of breakdowns. Frequent causes of overload are: Starting or stopping tool while it is in the work; crowding or jamming tools in an attempt to hurry the job; dull bits or blades; severe voltage drop under load due to under-size cord or overloaded power line.

Motor commutators are subjected to constant wear from the brushes, and they should be inspected regularly. When wear becomes evident, the armature should be removed, and the commutator should be turned down in a lathe and spaces between the bars should be under-cut. Prompt care of slightly worn commutators will avoid complete breakdown.

Be sure brushes slide easily in holders, seat properly on the commutator, and that spring tension keeps them seated. Replace brushes before they wear down to irregular stubs . . . it's cheaper to replace them frequently than to risk the damage caused by worn brushes. Keep metallic dust from accumulating around brush and commutator. Replace broken brush caps immediately.

Do not substitute brushes. Brushes are made to fit specific motors, and improper brushes will injure the commutator.— SKILSAW, INC.

◆

The Squirt or Water Jet

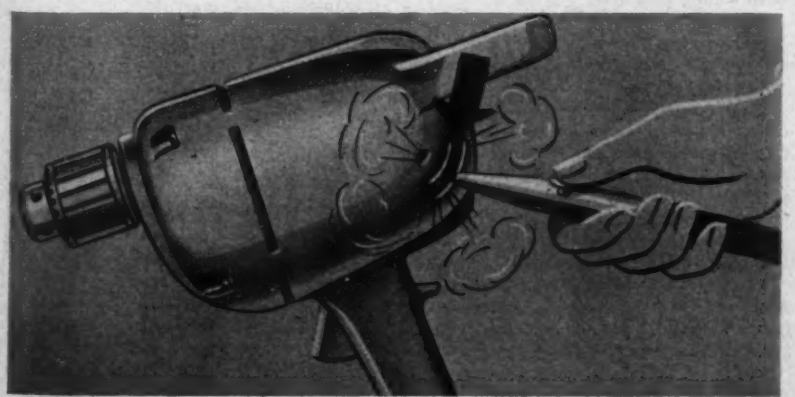
When high speed paper machines first came out, machine tenders had a lot of trouble in getting the paper over the machines. The paper still had to be taken over by hand just as it had been previously.

The method of leading a sheet from the couch to the first press felt was for a machine tender to get a strip by hand upon the first felt and then to widen it out by tearing it from the edge.

Machines were being run in this manner in speeds in excess of four hundred feet per minute, when John Merriman of Livermore Falls, Maine, conceived the idea of using a split pipe and a fine stream of water for cutting the sheet and making the tail.

Merriman was manager of a mill in Jay, Maine. He also was a lawyer. Yet, he did not patent the device now commonly known as the squirt or water jet. Although only a simple arrangement, the device has contributed much to the present development of high speed paper machines.

As so often happens to inventors, John Merriman died in poverty.—ARCHIE MCCAFFERY.



◆

How to Clean and Dress Leather Belts

Keep belts as clean as possible at all times for best results. If machine bearings are throwing oil or grease, these substances will get on the belt, reducing its life and pulling power.

If leak cannot be stopped at the source, the installation of deflectors or throwing discs will be helpful.

A small amount of oil on a belt can sometimes be removed by ordinary wiping. If this does not do the job, give it a thorough scrubbing with a solution of carbon tetrachloride and unleaded gasoline, using a stiff jute brush and working in the direction of lap joints so as not to lift them but rather lay them down, or

Remove belt and soak it for five or six hours in a degreasing solution consisting of one part carbon tetrachloride to three parts of unleaded gasoline. If carbon tetrachloride is not available, the belt can be soaked in any of the cleaning fluids used by dry cleaning establishments. Due to the fire hazard, the soaking and cleaning of the belt should be done in the open or where ventilation is good. After removing from the bath, allow belt to dry thoroughly. Leather belting should always be redressed after cleaning.

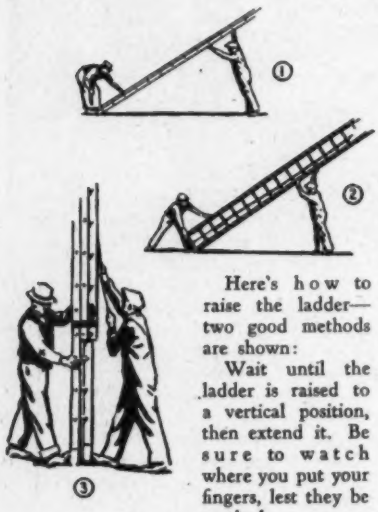
Use a belt dressing approved by the belt manufacturer and designed to supply the necessary oils which were lost in use or during cleaning.

When pulley faces begin to polish, it is a sign that dressing is needed on the belt. Under normal conditions, dress belts every three to six months.

If cemented laps show signs of opening, stick them down immediately.—AMERICAN LEATHER BELTING ASSOCIATION.

Extension Ladders — How to Raise and Extend

There is plenty of chance for injury in the handling of extension ladders. Raising and extending one of any appreciable length is a two-man job and, even so, it requires extreme care.



Here's how to raise the ladder—two good methods are shown:

Wait until the ladder is raised to a vertical position, then extend it. Be sure to watch where you put your fingers, lest they be crushed.

To lower the ladder, simply reverse the operation, but first raise the upper section just enough to release the hook so it can be lowered.—*Safety Instruction Card No. 178*, National Safety Council.

◆

Providing Protection From The Fire Hazards of Flammable Solvents

Flammable solvents, such as gasoline, naphtha, benzene, and acetone, require careful handling, even when used in small quantities. They should be kept in approved safety cans and applied where there is no danger of ignition from flames, mechanical or electric sparks, or high temperatures due to fire or friction. Smoking in the area of application should be prohibited.

When large quantities of flammable solvents are used, further protective measures are necessary.

To prevent disastrous explosions, the concentration of solvent vapor in the atmosphere must be kept below the lower explosive limit by using equipment that minimizes the escape of vapor into the air and by supplying a sufficient amount of fresh air by means of natural or mechanical ventilation. In practice, the vapor content of the workroom air should be kept below the "maximum allowable concentration for continuous exposure," which is basic protection from both toxicity and explosion.

But good general ventilation does not eliminate the localized fire hazards created by volatile flammable solvents. Special precautions must be taken to prevent the ignition of spills, creeping vapors, which may travel 100 feet or more from the point of origin, vapors collected in low places, such as pits or basements, and the explosive vapor-air mixtures that remain in containers emptied of solvents.

In removing all possible sources of ignition from areas where flammable solvents are being handled, enclosed explosion-proof electrical equipment should be installed in accordance with the National Electrical Code; non-sparking bronze tools should be used; and workers should be provided with shoes made without nails.

Flammable solvents should be stored and handled in equipment installed in accordance with the standards of the National Fire Protective Association.

For extinguishing fires in flammable solvents, an ample number of portable fire extinguishers, bearing the approval of the Underwriters' or Factory Mutual Laboratories, should be provided. Types suitable for use on fires in flammable liquids include foam, vaporizing liquid, carbon dioxide, loaded stream, and dry power. In addition, equipment presenting special fire hazards, such as open tanks containing solvents, may require individual protection with built-in fire-extinguishing systems.

In all cases, workers should be trained in fire fighting and in other operations that will help to prevent loss of life and property in the event of fire.—Safety Research Institute, Inc.

◆

Check for Minor Belt Repairs and Pulley Alignment

note and care for even slight repairs may add to their service-life. Check for misalignment of pulleys and shafting and make adjustments as needed so the belts may continue to run true and give maximum service. Don't let the belts rub against beams, shifting forks, pipes or anything else.—Samuel L. Allen.

◆

Hand Hack Saw Blade Troubles and Cures

Breaking of teeth: CAUSE #1—Teeth too coarse for the work; CURE—Use a blade that fulfills the "three-tooth rule.*" CAUSE #2—Too much pressure; CURE—If finer tooth blade does not help, use less pressure. CAUSE #3—Clogged teeth; CURE—Use a coarser tooth blade when cutting soft stock.

Breaking at holes at ends: CAUSE—Too much tension on blade; CURE—Go easy on the thumbscrew at end of frame.

Breaking of body in middle: CAUSE #1—Not enough tension on blade, allowing it to twist, bend, cramp and jam; CURE—Set up frame thumb-screw tighter or use a sturdier frame if necessary. CAUSE #2—Using a new blade in an unfinished cut begun by an old blade; CURE—Turn the work over and start a new cut that will meet the old cut.

Rounded teeth: CAUSE—Excessive slipping; CURE—Use a slower stroke with heavier pressure and be sure to avoid pressure on recovery (back) stroke.

Crooked cuts: CAUSE #1—Set worn off teeth; CURE—Try a new blade. CAUSE #2—Blade out of alignment; CURE—Use a sturdier frame that will neither bend permanently nor give under pressure. CAUSE #3—Pressure too great; CURE—Limit the pressure to what your wrist can take, not to what your shoulder can give.—Clemson Bros., Inc.

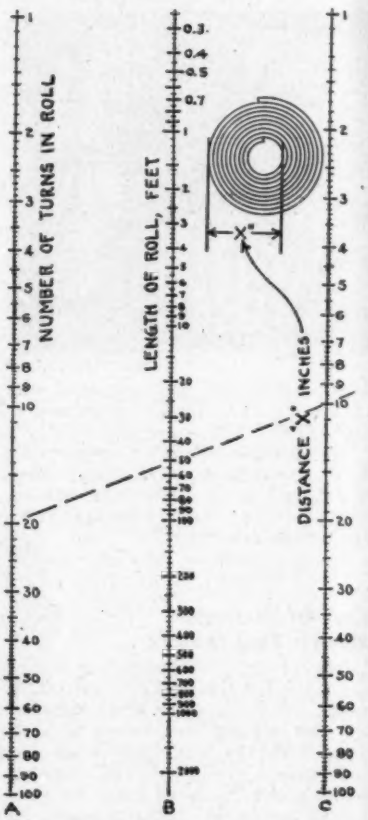
(*3 consecutive teeth in contact with stock being cut at all times.)

◆

Number of Feet in a Roll

Use this simple chart when you want to know the number of feet in any roll of belting or other similar material.

The sketch shows how to measure the roll. The distance "X" must be measured in inches, exactly as shown. Only one measurement is necessary.



Example: How many feet of material are in a roll which has 20 turns, the distance "X" being 10 inches?

Simply connect the 20 in column A with the 10 in column C and the answer is found in column B. It is a little over 52 feet.—W. F. Schaphorst, M. E.

◆

What About Smoke?

Smoke is more of a nuisance than a waste of coal unless it is accompanied by CO in the flue gas. On the other hand, smoke is a good indication that CO is present and the gas should be analyzed for it. Even small percentages of CO reduce the boiler efficiency greatly. (See accompanying table on opposite page.)

Carbon Monoxide Loss Per Cent

Heat losses resulting from CO in flue gas with varying amounts of excess air and CO_2. Illinois and West Virginia high-volatile coal.

Excess air	CO_2 in flue gas	Illinois Coal (68% carbon)				West Virginia Coal (79% carbon)			
		CO: (per cent)				CO: (per cent)			
Per cent	Per cent	0.25	0.50	1.00	1.50	0.25	0.50	1.00	1.50
125	8	1.7	3.3	6.3	9.0	1.7	3.4	6.4	9.1
100	9	1.6	2.9	5.7	8.1	1.6	3.0	5.8	8.2
80	10	1.4	2.7	5.1	7.4	1.4	2.7	5.2	7.6
65	11	1.2	2.4	4.8	6.7	1.2	2.4	4.8	6.9
50	12	1.1	2.2	4.4	6.3	1.1	2.3	4.4	6.4
40	13	1.1	2.1	4.0	5.9	1.1	2.2	4.1	6.0
30	14	1.0	2.0	3.8	5.5	1.0	2.0	3.8	5.6
25	15	.9	1.8	3.5	5.1	1.0	1.8	3.5	5.2

The CO_2 content of the gas should not be raised beyond the point where CO can be detected with the Orsat. Smoke itself is finely divided particles of carbon and ash. Smoke should be avoided, and in many cities, this is required by law, yet remember that a clear stack may be wasting much larger quantities of coal than a smoky one. (Again refer to table.)—R. F. Stilwell.

◆

Pulverizer Silver Alloy Brazes Small Round Wires

A new method brazing small round wires with diameters of 0.0226 to 0.049 inch, has been adopted in the Distribution Transformer Division at General Electric's Pittsfield Works. A mixture consisting of equal amounts of filed silver solder and borax flux is used.

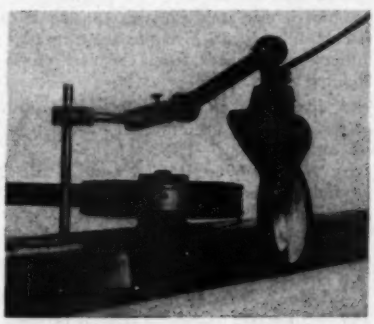
The end of one of the two wires to be brazed is either moistened or heated and then inserted in the container holding the mixture. When a sufficient amount adheres to the wire, the two ends being brazed are placed together and heated over a gas flame until the alloy fuses them. If normal heating is applied, the joint will be free of lumps and points, eliminating a finishing operation before the braze can be insulated.

In the conventional method of brazing these small wires, a strip silver alloy and flux was used. This resulted in a loss of the silver both from drip at the braze and from an excess of brazing material at the point of contact. The method has resulted in a saving of approximately 80 per cent of the strip silver alloy. — General Electric Co.

Magnifier of Paper Cutter

In one plant that makes and prints waxed paper for bread wrappers, the paper cutting machine (Seybold) operates on a full-time basis. The operator has to look up at the steel tape each time he sets the machine for a different cut or trim. The gauge or tape must be set accurately, if not the paper is cut to incorrect size and there is too much waste.

To offset mistakes from incorrect reading of the steel tape, this plant has installed an illuminated magnifier over the tape. The fluorescent light is thrown on the steel tape and the magnifying lens



amplifies numbers and graduations on the tape—both helping the operator to make accurate settings.

The magnifier is furnished with a base and two friction-joint arms. It has swivel joints at the base and at the top of the lens frame. To adapt this for use on the paper cutter, the base and one arm were removed and the remaining arm was attached to a simple fixture as illustrated.—Donald E. Buckwell.

◆

Belts Runinng to One Side of the Pulley

Occasionally a belt that ordinarily runs true will run to one side of the driven pulley. This may be caused by one of two things: Either the belt has become slack or the load has been increased by giving more work to the machines being driven or the journal boxes have become dry, thus causing friction that increases the load.

If the belt is too slack or the load too great, the belt will tend to run off. To remedy this, either take up the belt, thoroughly oil the journals, take off the extra load—or a combination of all.

The belt will run to the low side of the pulley if the driven shaft gets out of parallel with the driving shaft. A pulley that is keyed on will sometimes slip sidewise, or a whole shaft slip endwise if the collar becomes loose.

If the two shafts are parallel and there is a slightly higher place on one pulley than on the other, the belt will run to the high place. If the shafts are not parallel and the pulley faces are straight, the belt will run to the low side or that closest to the driving shaft. To correct this, make the shafts parallel with each other. One or both shafts may be out of level as well as show unequal distance between the ends.

Other reasons for belts running to one side, besides that of poor alignment, are that of unskilled lacing, allowing one edge to stretch more than the other; or the belt may be in poor condition, and create a tendency to run irregularly.—Samuel L. Allen.

◆

A Measuring Kink

A measurement that often ends in disaster because it is not accurately made involves the exact distance between two walls or objects which cannot be measured directly with a rule, cannot be measured with a stick that is too long, or with a stick that is too short.

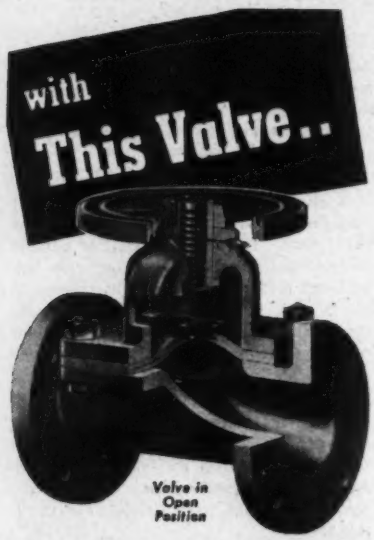
An excellent kink for obtaining the exact distance is shown in the accompanying sketch. Use two sticks such as laths

or anything else sufficiently stiff. The total length of the two must be somewhat greater than the distance between the walls or objects being measured so that they will overlap. Put them together in contact and slide outward until the two ends "just touch" the desired limit points. Then clamp or fasten them together to obtain the desired distance.—W. F. Schaphorst, M. E.

◆

Improperly Jointed Belts

The majority of belts which weave back and forth do so because they are improperly joined, that is, the belt is crooked at the point of lacing. Many belt men who do not use a square when cutting their butt joint will find it an easy matter to cut the butt ends so they match by the use of the following simple method. If a try-square cannot be found, rather than guess at cutting a square joint, as many do, turn one end of the belt inside out and place it on top of the other end. This places the pulley side of one end of the belt against the back side of the other end. Cut both ends at the same time, thereby cutting each identically the same. Butt ends cut in this manner will match whether cut square across the belt or at an angle. It must always be remembered to turn one end before cutting so as to be sure that the ends match. When possible, use a try-square so as to make both ends of the belt square. —Chas. A. Schieren Company.



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Convention Papers . . . Abridged

The abridgments in this section are from papers presented "by title" at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 10, 1945.

The "Fading" of Groundwood by Light

I. A Study in Relation between the Variables in Sheet Formation and Fading

HARRY F. LEWIS[1]
EDWARD A. REINECK[2]
DOUGLAS FRONMULLER[2]

The problem of the discoloration of groundwood did not become prominent until the latter part of the nineteenth century. This was due to the fact that the first groundwood pulp in this country was made in 1867 and found its principal use as a filler. The amount of groundwood pulp and paper produced was not very large, and its uses were limited. Although the discoloration of groundwood was not immediately noticed, considerable attention has been given to the degradation of paper made from chemical pulps and rag pulps.

A divergence of opinion is to be found in regard to the groundwood degradation reaction. In 1897, Cross (*J. Royal Soc. Arts* 45:684-696, 1897) stated that groundwood paper discolored very rapidly. He pointed out that paper prepared from groundwood was attacked by atmospheric oxygen, undergoing a veritable combustion of the lignocellulose. Evans (*J. Royal Soc. Arts* 45:597-600, 1898) in 1898 confirmed Cross's statement that paper prepared from groundwood pulp disintegrated in the presence of oxygen. He further stated that the disintegration was accompanied by an alkaline reaction of the paper. In 1903, Elemm (*Paper Makers' Monthly J.* 41, no. 4:118-119; no. 5:154-155, 1903) introduced light as another factor which contributed to the discoloration of groundwood. Russell (*Phil. Trans.* B. 197; 281-289, 1904) stated that the chemical activity of wood surfaces could be shown by its action on a sensitized plate in the dark. During this period the effects of light and heat were more fully studied and some work appears to have been done with radium (*Papier-Fabr.* 6:1349-1352, 1907). Radium emanations destroyed the strength of the paper; no mention was made of its discoloration.

For a period of years, most of the investigation reported dealt with the storage problem of wet groundwood. The main storage problems were discoloration and degradation of the wet groundwood by molds and bacteria, since the high moisture content (60-80%) made groundwood lap an ideal medium for the growth of the micro-organisms responsible for the discoloration.

Schoeller (*Wochbl. Papierfabr.* 43: 3222-3225, 3408-3409, 3489-3491, 3673-3675, 3963-3965, 4148-4150, 4336-4338, 1912) in 1912 studied the relative discoloration of paper made from mechanical pulp, chemical pulp, and rag pulp. He stated that paper containing mechanical pulp discolored most rapidly, papers containing chemical pulp discolored to a smaller extent, whereas papers made from rag suffered only a slight discoloration. Herzberg (*Paper* 22, no. 1:11-12, March 13, 1918) in 1918 stated that yellowing is not an oxidation, for the same effects occurred in nitrogen. He found that the discoloration was brought about by light and heat. Hitchins (*Paper* 22, no. 20: 11-15, 1918) in 1918, working with rag paper, also showed that yellowing is due to light, moist heat, and dry heat; Bachelder (*Paper*, 24:1096-1097, 1919) in 1919 pointed out that yellowing of cotton linters and bleached sulphite pulp is due primarily to heat. In 1920, Aribert and Bouvier (*Paper* 27, no. 4:13-14, 44; no. 5:18-19; no. 6:20-21; no. 7:23-25, September 29, October 6, 13, 20, 1920) concluded that yellowing of groundwood (impure lignocellulose) is caused by the oxidation of fats, waxes, resins, and lignin. They showed that light had a catalytic effect in breaking down the cellulose or some of the impurities present in paper. Sindall ("Paper technology." London, Griffin, 1920, p. 10-11) in 1920 stated that yellowing of paper from mechanical pulp was a result of a slow oxidation of noncellulosic materials. Klemm (*Papier-Ztg.* 46:1954, 1921) in 1921 attributed the yellowing of paper to the actica of aniline vapors in printer's ink. However, in 1923 he (*Wochbl. Papierfabr.* 54: 1515-1518, 1923) stated that yellowing is usually due to the oxygen of the air; other factors that contributed to the effect were heat and light.

In 1924 (*Papier-Fabr.* 22:23-26, 1924) it was shown that groundwood changes more or less rapidly in color, depending on the wood used. This was attributed to the effect of the air on the sap in the wood, since the action proceeded from the surface to the interior of the pulp. Pine, beech, birch, and alder changed in color in order given. Escourrou (*Chimie et industrie* 19:989-997, 1928; *Pulp Paper Mag. Canada* 26:1549-1552, 1928) studied the effect of the light from a quartz mercury vapor lamp on wood flour and groundwood and observed a severe degradation. Hoyer (Svensk Papperstidn. 34, no. 12:443, 444, 447, June 30, 1931)

[1]Research Associate, [2]Research Assistant, The Institute of Paper Chemistry. (Mr. Fronmuller is now on the staff of Scott Paper Company.)

(*) The work covered by the five papers in this series was carried out for the Groundwood Paper Manufacturers Association and it is published with the permission of the Association.

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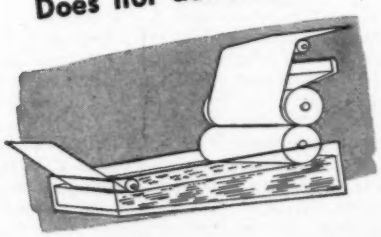

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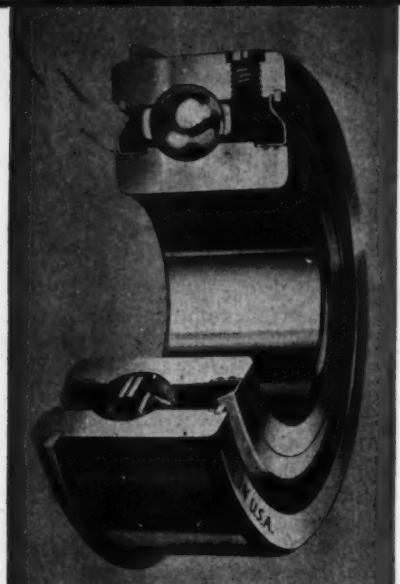

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in 1931 stated that the discoloration of groundwood pulp and paper is due to several causes, chief of which were:

1. Kind of pulp—pine, beech, birch, and alder show the greatest change in color, and spruce, fir, larch, and aspen to a lesser extent. Maple and basswood do not show any change at all.
2. Iron.

Hoyer found no remedy for the discoloration of groundwood.

Hirschkind (*Paper Trade J.* 95, no. 19: 31-32, 1932) in 1932 stated that the brown color or the discoloration of groundwood is caused by the transformation of the cell membranes into humus. Bakker (*Chem. Weekblad.* 34:543-545, 1937; *Zellstoff u. Papier* 18:160, 1938) in 1937 found that the coloring matter produced by the illumination of groundwood paper by means of sunlight or an ultraviolet lamp was extracted by means of 0.5% ammonium hydroxide and was precipitated as a dark brown substance with hydrochloric acid. The composition of the precipitate was found to be 58.3% carbon and 4.8% hydrogen. When the substance was fused with potassium hydroxide, pyrocatechuic acid, pyrocatechol, and oxyhydroquinone were detected in addition to oxalic acid. The use of Kirschner's sublimation method at 220 C. yielded vanillic acid and a small quantity of vanillin. Bakker contended, therefore, that the yellowing of groundwood papers is due largely to the oxidation of lignin with the formation of humic acid. This is in accord with Hirschkind's deduction.

Schwalbe (*Papier-Fabr.* 35, no. 27:243-247, 1937) in 1937 stated that fading was associated with a loss in carbohydrates. He proposed to add glucose to newsprint as a means of retarding its discoloration. Sandmo (*Papir-J.* 25, no. 23:328-329, December 15, 1937) in the same year, pointed out that high temperature grinding favored the removal of the soluble substances from wood. This treatment results in a more rapid yellowing of the pulp, especially under sunlight, followed by a decrease in the strength properties of the fiber.

Many articles dealing with the changes in color of the higher classes of papers stress two possible sources of color formation among the components of the paper: (1) a color formation resulting from the presence of iron compounds, rosin acids, and tannin; (2) the modification of the carbohydrates to yield more highly colored compounds.

In the case of the groundwood papers, it is possible that the color characteristics of the noncarbohydrate or carbohydrate fractions, or both, may change as the result of exposure to light. The conditions responsible for the color change, in addition to the action of light, are somewhat open to question. Many investigators, such as Klemm, Cross and Bevan, and others, believe that the change is due to oxidation, and that the active oxidizing agent is the oxygen in the air. Herzberg (*Paper* 22, no. 1:11-12, March 13, 1918) stated that the reaction may proceed in nitrogen as well as in oxygen and concluded that the reaction, therefore, is not necessarily one of oxidation. It would appear probable that the reaction is a photochemical effect dependent upon light and possibly upon heat, with atmospheric oxygen playing a minor role.

Because of the meagerness of the fundamental data and the uncertainty as to the conclusions to be drawn from those data, the Groundwood Association, on November 22, 1937, established a project at The Institute of Paper Chemistry which included a fundamental investigation of the causes and mechanism of the discoloration of groundwood and a study, based upon this fundamental work, of procedures which might be used to delay or prevent discoloration.

In the discussion to follow, the commonly used term "fading" will designate the discoloration occurring in groundwood on exposure to light.

Before any exhaustive work could be carried out on the causes of the fading of groundwood, it seemed desirable to investigate the possible relation between color change and variables in sheet formation. Therefore, a considerable study was undertaken to develop information on the following points:

1. The effect of a variation in time of exposure of the groundwood sheet to the light of the carbon-arc Fade-Ometer.
2. The effect of variation in the source and quality of the groundwood.

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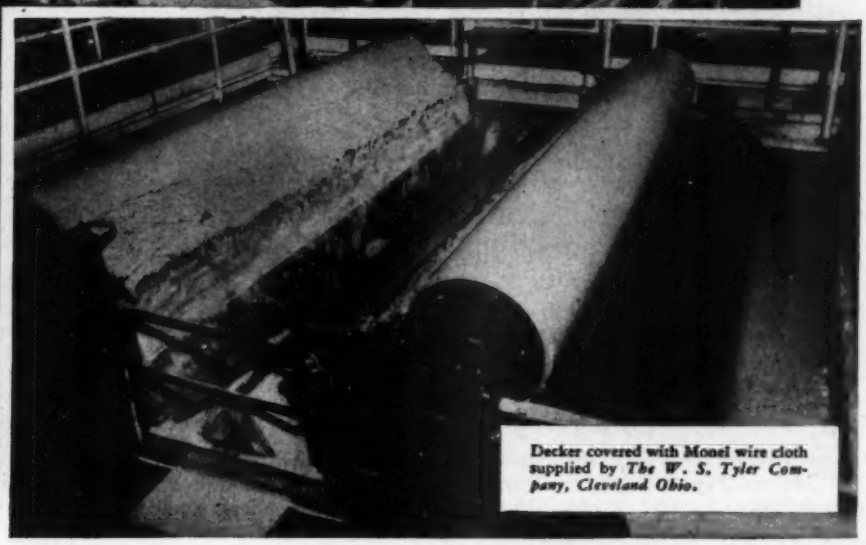

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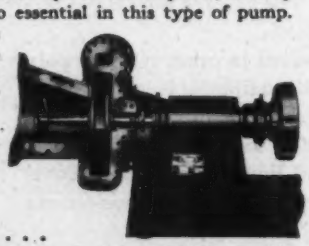

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3. The relative influence of heat and light on the change in color.

4. The effect of variations in the technique of handsheet formation.

5. The effect of the addition of sulphite pulp to the groundwood furnish on the rate of fading.

6. The relation between the pH of the groundwood sheet and its rate of color change.

The Atlas carbon-arc Fade-Ometer was used as the standard fading instrument for following the color change in handsheets; in it, 40 sample (2¾ x 3 in.) can be exposed at one time. In these exposures the felt side of the sheet was placed so as to face the light of the Fade-Ometer.

Experiments were first carried out to determine the shortest exposure permissible for use in a standard testing procedure.

A second series of tests was run in order to compare the first sample of groundwood with a groundwood of somewhat different quality obtained from another mill. Fresh handsheets were made from both pulps and fading tests were carried out over various time intervals.

A third preliminary series was run to determine whether the action of the Fade-Ometer involved changes caused by heat as well as by light. Handsheets prepared from both pulps were suspended in an oven in a circulating current of air at 100 C. for a period up to 8 hours.

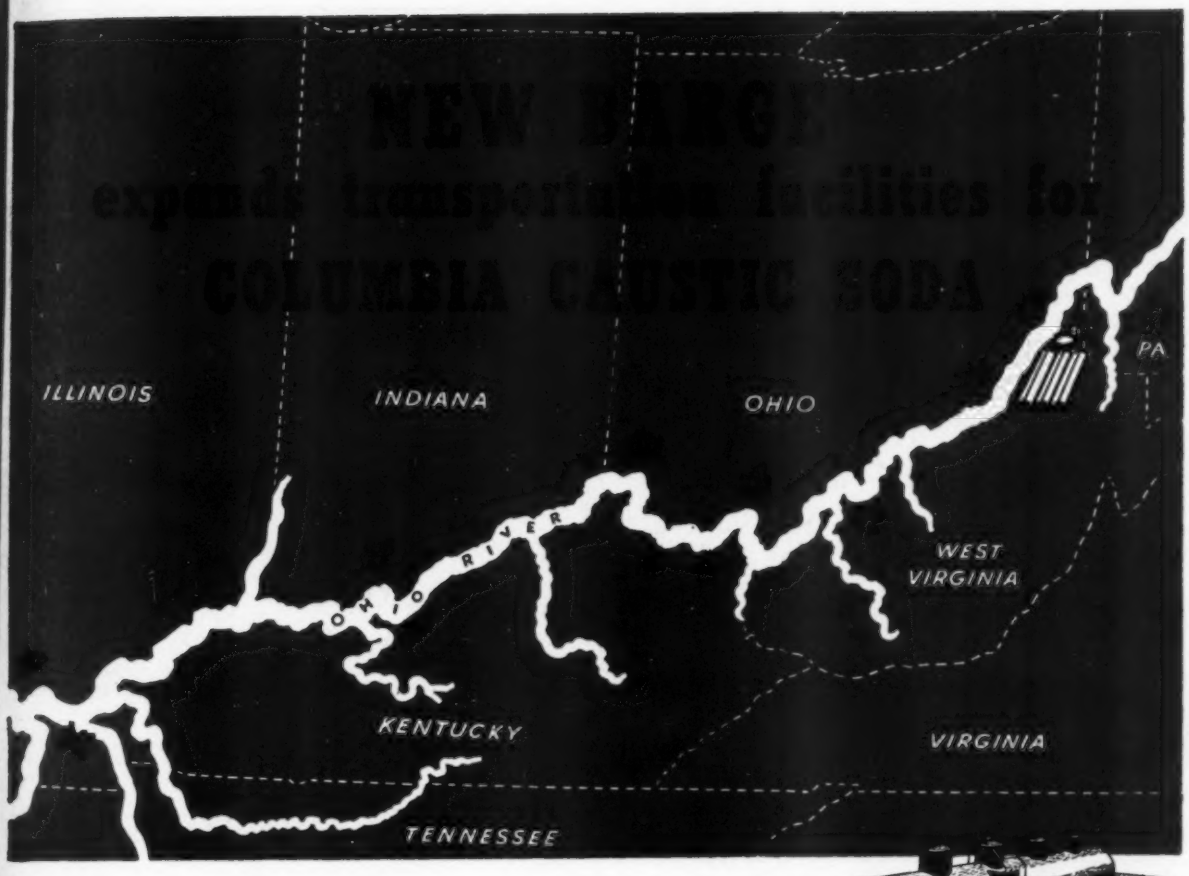
Another point to be determined in establishing a standard fading test was the effect of the usual variations in the composition of the handsheets and of variations in the intensity of the light in the different sections of the Fade-Ometer. In order to find out what differences might be expected in a series of handsheets made one after the other from the same batch of stock, nine different sheets prepared from the same beater of pulp were exposed at the same time in the Fade-Ometer for one hour. The original brightness of these nine sheets was between 58.9 and 60.0%, a spread of 1.1%. The brightness of the aged sheets ranged from 53.4 to 54.5%, also a variation of 1.1%. The greatest drop in brightness on aging was 5.2% and the smallest drop was 5.0%, or a variation of 0.8%.

Inasmuch as most commercial groundwood sheets are furnished with sulphite pulp, a brief study was made of the possible effect of the addition of bleached and unbleached sulphite on the rate of color change.

The first series was run in the Fade-Ometer for 16 hours. Five samples were investigated, having the following furnishes:

100% groundwood
100% unbleached sulphite
60% groundwood — 40% unbleached sulphite
60% groundwood — 40% bleached sulphite
40% groundwood — 60% bleached sulphite

Surprisingly, the addition of bleached sulphite to the groundwood in the amounts specified seemed to affect very little the rate of fading; the loss of brightness for



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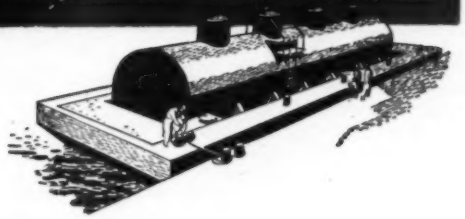

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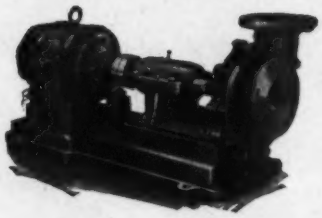

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100% groundwood and for 60% groundwood—40% bleached sulphite is the same, namely, 24-25%. Unbleached sulphite, on the other hand, acts more nearly as might be expected. Whereas 100% groundwood loses 24.5 points on 16-hour exposure, 100% unbleached sulphite loses but 8.1 points, and a 60% groundwood—40% unbleached sulphite loses 17.4 points.

Because of the unexpected behavior of the groundwood-bleached sulphite mixtures, a somewhat more detailed series of tests was carried out in which sheets of six furnishes were exposed to sunlight. The six furnishes were as follows:

100% bleached sulphite
20% groundwood—80% bleached sulphite
40% groundwood—60% bleached sulphite
60% groundwood—40% bleached sulphite
80% groundwood—20% bleached sulphite
100% groundwood

These sheets were exposed to sunlight for 5, 20, and 35 hours and the brightness determinations made before and after exposure.

The actual drop in brightness for the 100% bleached sulphite sheets on exposure is 7.2 points; for the 100% groundwood, 21.1 points. Furnishes containing 20 and 40% bleached sulphite, respectively, seem to lose about as much as do the 100% groundwood furnishes. Bleached sulphite added to groundwood in amounts up to 40% brightens the sheet but does not improve its relative resistance to fading. On the other hand, groundwood added to bleached sulphite to the extent of 20% of the furnish, affects to a marked degree the fading behavior of the furnish.

One of the variables in sheetmaking which appeared to be of importance in a study of the fading of groundwood was that of the acidity of the sheet. Two series of experiments were therefore set up for the purpose of measuring this effect.

In the first, groundwood handsheets were treated with various acids, bases, and salts such as tartaric, acetic, and boric acids, and sodium bicarbonate and borax, using 0.5 and 0.1% of the reagents on the weight of the sheets.

Inasmuch as no attempt was made in this first preliminary experiment to estimate the pH of the sheet, a second series was set up at a somewhat later date, in which varying amounts of sulphuric acid and sodium hydroxide were used to control the pH; in every case the actual pH of the water extract of each sheet was determined.

After air-drying the sheets dipped in the above solutions, they were cut to the proper size and exposed in the Fade-Ometer for six hours. The material not required for exposure was tested for the pH of its water extract. The brightness of the faded and unfaded samples was determined. The results revealed that the original brightness of a groundwood sheet, as well as its brightness after fading, is greatly influenced by the pH of the sheet. Other things being equal, the point of maximum brightness for both unexposed and faded sheets is in the pH range of 3.0-4.5. On either side of this area, the brightness falls away—on the acid side with considerable acceleration. The brightness of the unfaded sheets is much lower at 9.9 than at 2.1; the faded sheets at these two pH values have the same and lowest brightness.

II. The Physical Mechanism of Fading

PHILIP NOLAN[1]
J. A. VAN den AKKER[1]
W. A. WINK[2]

This paper includes a discussion of experiments carried out to determine the part played by such conditions as atmospheric oxygen, humidity, temperature, etc., on the ultraviolet light fading of groundwood handsheets. In carrying out the tests, portions of the handsheets were placed in a quartz flask which could be evacuated by means of a vacuum pump and the samples were exposed to the light of a Hanovia mercury arc (Hanovia Chemical and Manufacturing Co., Type BU, D.C. arc, 7.5 amp.), the intensity of which was controlled by means of photoelectric equipment. A General Electric recording spectrophotometer (Michaelson, J. L., *J. Optical Soc. Am.* 28: 365, 1938) and a General Electric reflection

[1]Research Associate, [2]Technical Associate, The Institute of Paper Chemistry. (Mr. Nolan is now serving with the U. S. Navy.)

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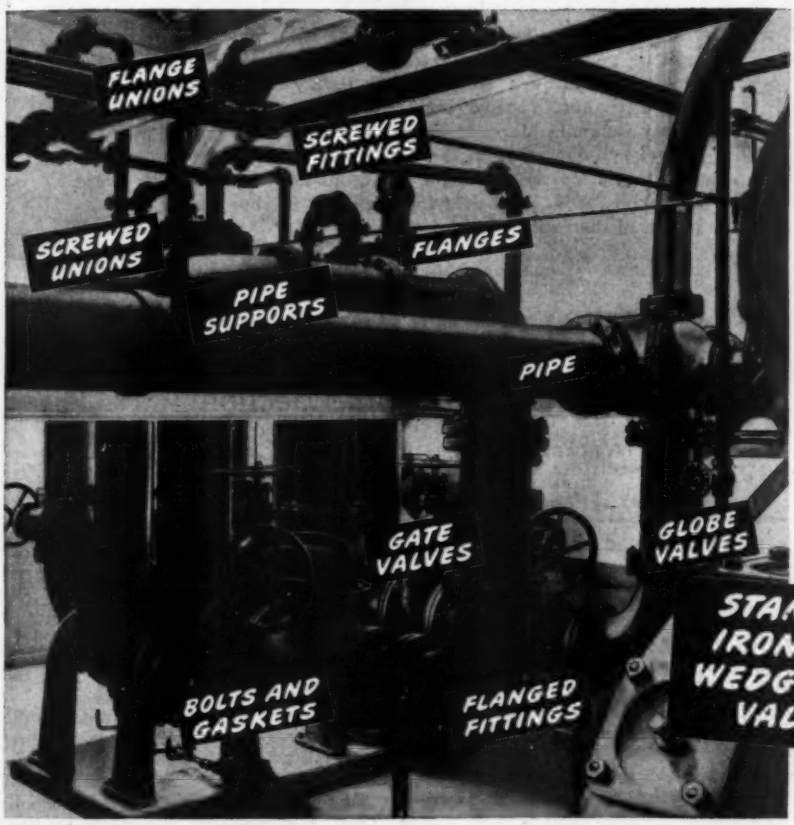

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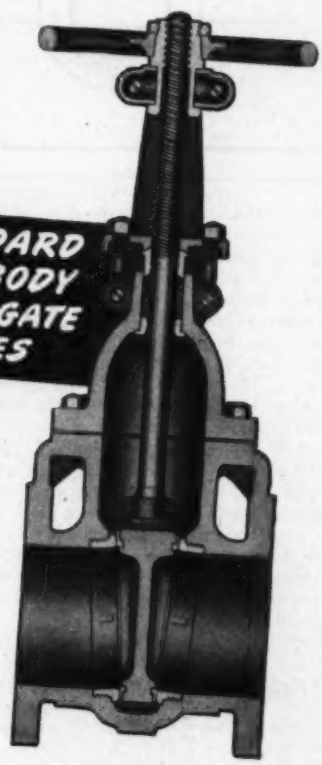

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meter (Michaelson, J. L., *Gen. Elec. Rev.* 38:194-196, 1935) were used for evaluating the fading.

Strips of groundwood handsheets were faded in the neck of a quartz flask which was mounted directly in the beam of the mercury arc in such a manner that the sample was 19 cm. from the "burner" of the arc. The arc was always turned on 0.5 hour before fading exposures were started, and its intensity was checked by means of a blocking-layer photocell connected directly to a Leeds and Northrup galvanometer. In order to control the ultraviolet intensity of the arc, a piece of lens paper which had been dipped in a dilute solution of Uranine B dye (Heller and Merz), was placed with an ultraviolet filter over the sensitive surface of the photocell.

Brightness measurements were made before and after fading under the arc.

A number of experiments were then made to determine the relative fading of groundwood handsheets under various conditions.

The first tests were run to determine what part, if any, atmospheric oxygen plays in the fading. Five exposures were made:

1. Groundwood paper was exposed to the arc in an open flask under the conditions described.

2. A second sample was exposed similarly but in a flowing atmosphere of oxygen.

3. In the third experiment, nitrogen was used in place of oxygen.

4. Two separate exposures were made of strips set in the same quartz flask and evacuated; the first was faded for two hours after 16 hours evacuation, the second after 49.5 hours of evacuation.

A second series of experiments was then arranged to determine the effect of variations in humidity and in temperature on the rate of discoloration of groundwood by ultraviolet light.

To study the effect of humidity, a sample of a groundwood handsheet was faded in air carrying a high moisture content. A second sample was faded after drying over phosphorus pentoxide for 22 hours. A control sheet was faded in air containing the normal atmospheric moisture.

The effect of temperature was determined by fading a sample for 2 hours at a temperature of 100 C., the temperature being read immediately under the sample. For comparison, a blank was run at room temperature.

It was of interest to observe which particular wavelength ranges in the ultraviolet spectrum were causing the fading.

This was first determined in an exploratory experiment as follows: A groundwood handsheet was placed in the plate holder of a Bausch and Lomb medium quartz spectrograph and exposed to the dispersed radiation of the Hanovia arc for 75 hours, using a 1-mm. slit. At the positions corresponding to the wavelengths which cause fading, there should be narrow, dark bands on the paper. A very slightly discolored spectrum was observed on the handsheets at wavelengths of 365, 334.2, 313.2, and 302.2 mmu, the discoloration being most marked at a wavelength of 313.2 mmu. (It is of practical interest to note that light of wavelength shorter than 313.2 mmu is present in the summer sun.)

In order to determine roughly the energy available, a strip of the handsheet was placed over the slit of the spectrograph and exposed to the total radiation of the arc for 30 hours, under which condition a discoloration was produced only slightly greater than that in the dispersed spectrum at 313.2 mmu.

Following these preliminary experiments, a rather extended study of the photochemical nature of fading was carried on. In the normal studies of photochemical processes, the following data are usually interpreted to have significance in terms of the nature of the chemical reaction:

1. Spectral sensitivity of the reaction—i. e., the variation of the fading per unit light intensity for different wavelengths of light illuminating the sample.

2. The variation of the rate of reaction with the intensity of the absorbed light.

3. The variation of the rate of reaction with variations of the temperature of the radiated substances.

The experiments indicate that the reactions involved in the fading of groundwood are very complex. The following conditions all influence the rate of fading of groundwood by light:

1. Groundwood paper fades at a some-

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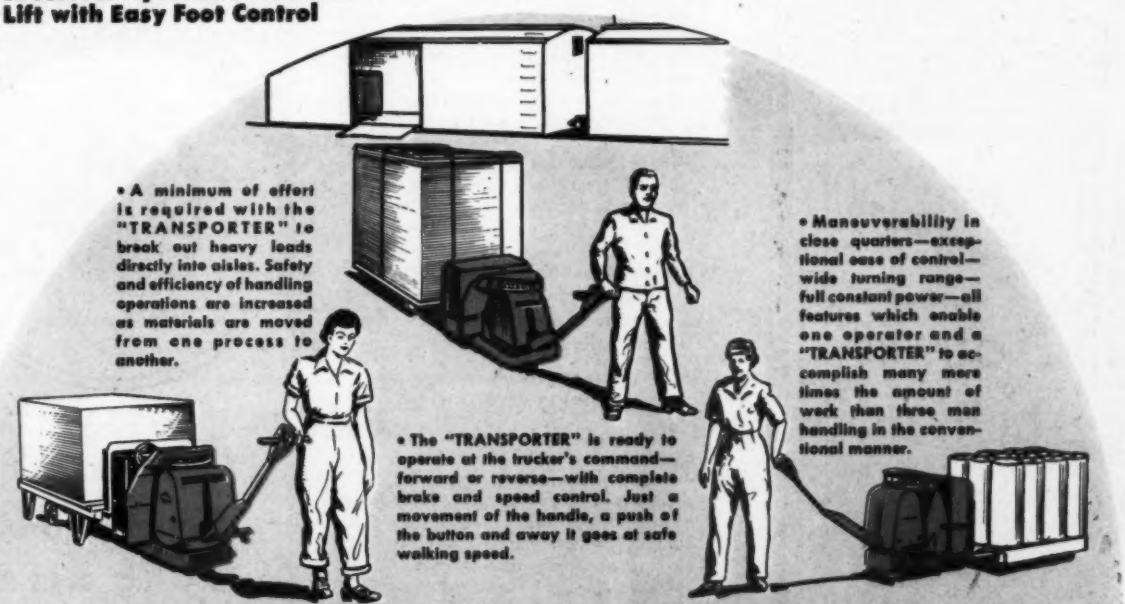

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what faster rate in the presence of atmospheric oxygen than in its absence. That the presence of oxygen is not all-important is indicated by the fact that the rate of fading of groundwood in a vacuum is very appreciable (which may have been due in part to the absorption of traces of oxygen by the fibers and which is not removed by the vacuum). Somewhat significant is the discovery that a groundwood sheet will fade at a much more rapid rate when exposed to ultraviolet light in a stream of ozonized air. Under parallel conditions, the handsheet exposed to both ultraviolet light and a stream of air containing 8 micrograms of ozone per cc. dropped twice as much in brightness as a similar sample exposed to ultraviolet light alone. Since ozone is a powerful oxidizing agent, this observation lends support to the theory that the fading reaction is either a photochemical reaction in which oxygen plays an indirect part or is a photochemically induced oxidation. The powerful role played by ultraviolet radiation alone is realized when it is pointed out that treatment with ozone alone causes a bleaching of groundwood.

2. All other things being equal, groundwood papers fade more rapidly under conditions of high humidity than under those of low humidity. This particular effect probably is of relatively little importance.

3. All other things being equal, papers fade more rapidly at high temperatures than at low temperatures. This is not solely a heat effect, because groundwood papers heated in the dark fade very little.

4. The major portion of the fading appears to be brought about by the action of light on the various solid components of the paper. These components undergo a marked chemical change during the aging process. Of particular interest in this connection is the remarkable similarity in spectral sensitivity curves of groundwood with the spectral absorption curve of lignin derivatives. This agreement between the shapes of the curves indicate quite definitely that the absorption of light by the lignin in groundwood is responsible for initiating at least a portion of the reactions which give rise to the characteristic yellowing of the color of exposed groundwood.

5. At least four lines of the low pressure mercury arc in the unfiltered ultraviolet appear to play an important part in the fading reaction. These are: 365, 334.2, 313.2, and 302.2 mmu. The most marked change is apparently brought about by light at a wavelength of 312.2 mmu. The greatest fading *per unit intensity of light* occurs at shorter wavelengths, and the maximum effect at 313.2 mmu is due to the larger intensity of this line in the spectrum of light from the bare mercury arc employed.

6. Observations made on the action of light of various wavelengths on the change in color of the groundwood sheet suggest very definitely that there are at least two photochemical reactions in the discoloration of groundwood. First, there is the so-called bleaching action produced by radiation of wavelengths longer than 385 mmu, with a maximum value of the increase in reflectance of about 2 points in normal brightness. Second, there is a normal dulling and yellowing of the groundwood sheet which results from the action of light of wavelengths shorter than 385 mmu. At the present time, it cannot be said whether or not the reactions initiated by the absorption of light at some intermediary wavelength give rise to a third type of reaction or to the simultaneous excitation of the two principal types of reactions with a different rate law holding for each.

III. The Changes Taking Place in the Nature of the Compounds Present in Groundwood as the Result of Fading

HARRY F. LEWIS[1] and DOUGLAS FRONMULLER[2]

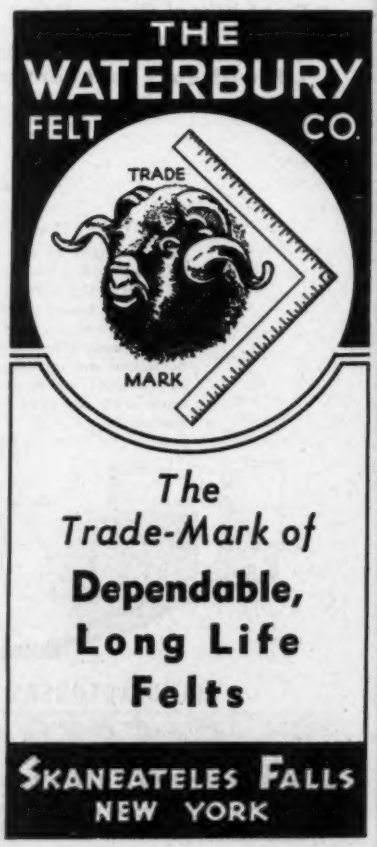
A test was made of the change in the chemical constants of groundwood as the result of exposure to ultraviolet light by preparing a large number of handsheets of groundwood pulp, exposing them to the light of the carbon-arc Fade-Ometer for an average of ten hours on each side, and analyzing the sheets, both before and after exposure, for their common chemical constituents.

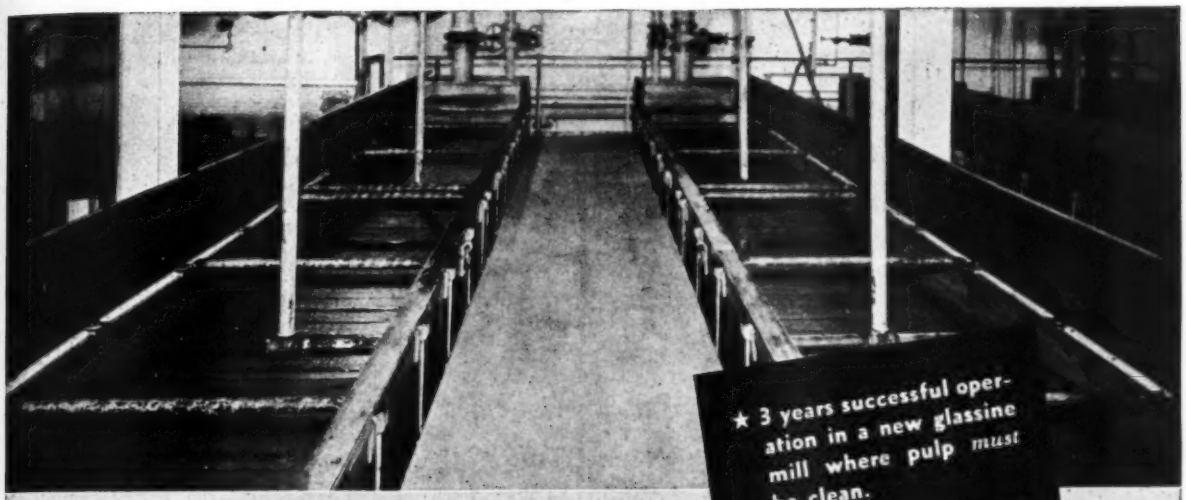
The drop in brightness suffered by the handsheets as the result of this prolonged exposure was 21 points, decreasing from about 61 to 40. Exact brightness measurements were of course impossible, because of the variation in intensity of light on the various areas of the large sheets exposed. The aged and unaged handsheets were analyzed for copper number, Cross and Bevan cellulose, lignin, methoxyl in lignin, pentosans, alcohol-benzene solubility, 1% sodium hydroxide solubility, and petroleum ether solubility. All values are calculated on the oven-dry unextracted basis. Cellulose and lignin analyses were made on alcohol-benzene extracted samples.

The extent to which certain of the components of the groundwood have been modified by the exposure to conditions in the carbon-arc Fade-Ometer is surprising.

The *lignin value* in the faded groundwood has been lowered by about 13% of its original value. This, of course, does not necessarily mean that the lignin has actually been removed from the sheet but that it probably has been converted by the Fade-Ometer to a product which is no longer insoluble in the presence of the sulphuric acid used in the lignin test; this chemical change has been in part a demethoxylation, for the residual lignin has 13.10% methoxyl, whereas the original lignin had 15.67% methoxyl, or a difference of 2.57%. This requires the assumption that all the lignin in the furnish was homogeneous, at least as far as the methoxyl content was concerned. If we assume four methoxyl groups for each lignin nucleus, the lignin nucleus in the aged sheet has lost an average of one-half

(1) Research Associate. (2) Research Assistant, The Institute of Paper Chemistry. (Mr. Fronmuller is now on the staff of the Scott Paper Company.)





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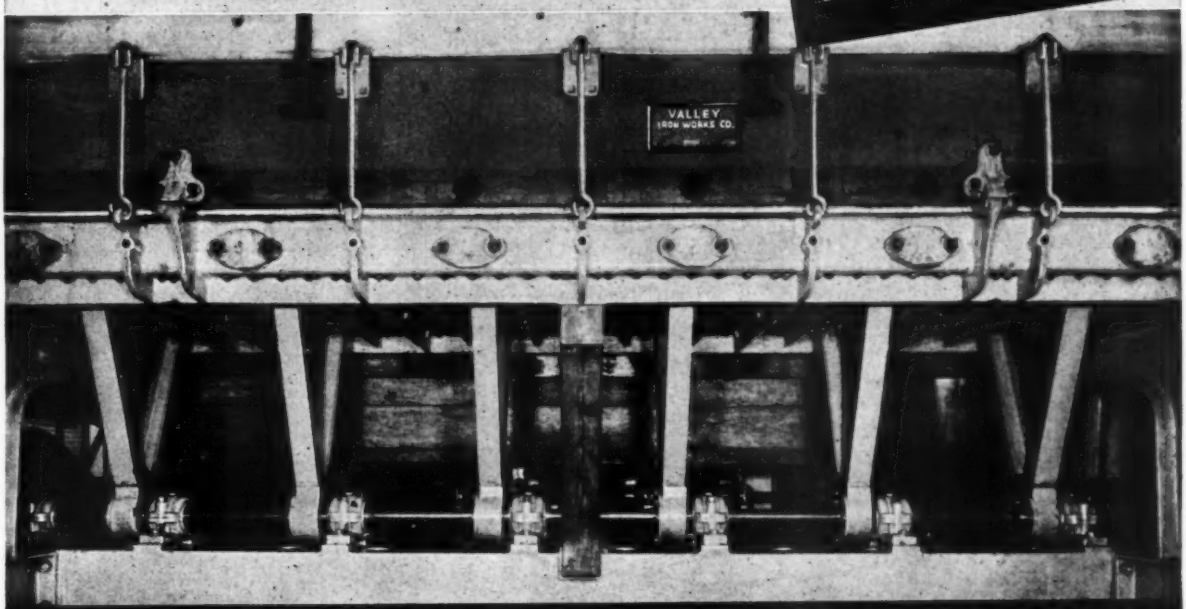

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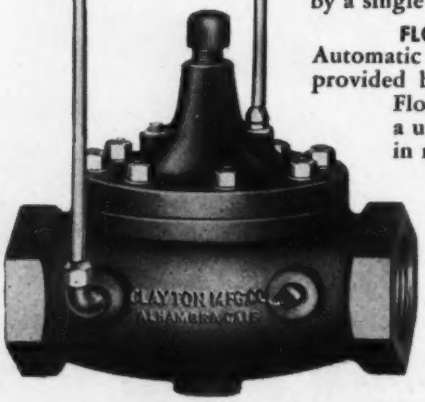

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of a methoxyl group during the reaction. It is likely that a portion of the lignin, situated in the sheet in such a position as to receive a larger share of the light, has been much more completely demethoxylated than is the case with the lignin in the center of the sheet.

The above points to one reaction taking place during fading which may have some significance—the gradual loss of methoxyl groups, followed by chemical modification of the product to a colored substance.

Recent work at The Institute of Paper Chemistry (Forman, L. V., *Paper Trade J.* 111, no. 24:33-38, November 21, 1940; *Tech. Assoc. Papers* 24:602-608, 1941; Glading, R. E., *Paper Trade J.* 111, no. 23:32-39, December 5, 1940; *Tech. Assoc. Papers* 24:556-563, 1941) on the changes in lignin which result from exposure to ultraviolet light point to the change in structure resulting when lignin is irradiated; not only are methoxyl groups split off, but there seems to be a possibility that a carbon-oxygen-carbon linkage in a ring in the lignin molecule is opened up and that further oxidation proceeds at this point. Vanillin has been established among the products of this further reaction; vanillin, in turn, may be oxidized and polymerized.

The *carbohydrate portion* of the groundwood has also undergone a deep-seated modification through the action of the light. Both pentosans and Cross and Bevan cellulose are converted to products which no longer permit them to appear in the more or less empirical tests used to determine those portions of the pulp.

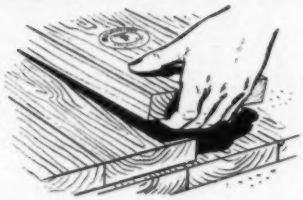
The indications from these analytical constants are supported by the results of the solubility tests, particularly the 1% caustic solubility. Although the Cross and Bevan cellulose and the pentosan values have been lowered 7 and 1.7% respectively, the caustic solubility has increased 26%.

The increase in lignin solubility in caustic may result from a depolymerization of the lignins, from oxidation of the lignin to alkali-soluble compounds, from demethoxylation with the liberation of phenolic groups, or from some other even more obscure cause.

The significance of the increase in ethanol-benzene solubility is uncertain. It seems more than a coincidence that this increase should almost exactly equal the decrease in lignin content. This inverse relationship between ethanol-benzene solubility and lignin content resulting from the degradation of pulp has been noted before at The Institute of Paper Chemistry in another field where it was ascribed to the depolymerization of lignin. It might also be due to the opening of a furan or pyran oxygen ring in the lignin molecule or to any of a number of other possible reactions. Demethoxylation of the lignin might conceivably be sufficient cause for the change in solubility.

In view of the changes which have been shown to take place in groundwood handsheets exposed to the carbon-arc Fade-Ometer, it was decided to ascertain the changes which occurred in a commercial groundwood-sulphite sheet exposed under normal conditions to the light of the sun. This sheet contained 45% groundwood

Treated Wood, YES



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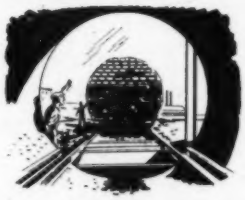

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and 55% bleached sulphite (on an ash-free basis); the sheet also contained about 15% clay. A large number of sheets of this paper were fastened on a Masonite quarterboard and exposed out-of-doors to the light of the summer sun for approximately one month. The total time of exposure amounted to 146 hours, about 73 hours to each side.

In order to follow the color changes, General Electric reflection meter brightness measurements and General Electric recording spectrophotometer spectral reflectance curves were made, for both unexposed and exposed sheets.

In addition to the color measurements, the sheets were analyzed for copper number, Cross and Bevan cellulose, pentosans, uronic acid, lignin, methoxyl in lignin, methoxyl in paper, alcohol-benzene solubility, 1% caustic solubility, pH of the water extract, total acidity, and lignin in the 1% caustic residue.

The analyses were complicated by the presence of approximately 15% of filler (clay). Because of this, the accuracy and reproducibility of the results obtained were not entirely satisfactory.

Changes in the nature of the chemical components of the commercial groundwood sheet as the result of exposure to sunlight were found to follow approximately the same course as in the case of the groundwood handsheets exposed to the light of the Fade-Ometer.

The lignin content of the sheet dropped from 9.9% to 5.6%, a loss of 43%, and the methoxyl in the isolated lignin residue fell from 14.1% to 8.6% or a loss of 39.0%. These changes were much more severe than those noted with the handsheets, where in 20 hours' exposure to the Fade-Ometer, 13% of the original lignin seemed to disappear as a result of fading, and approximately 16% of methoxyl present in the lignin was lost.

The alcohol-benzene solubility and, particularly, the caustic solubility of the paper increase to a very considerable degree as the result of aging. An investigation of the lignin left in the residues from the 1% caustic treatment of the unaged sheets revealed the fact that 80% of the lignin present in the unaged sheet could be isolated from the 1% caustic-insoluble residue. The aged sheet yielded on analysis only 57.0% of the lignin originally present and of this only 12.0% was present in the residue after alkali extraction. When this calculation is carried back to the lignin present in the unaged sheet, only 7.0% of the original lignin was found as alkali-insoluble material. In other words, the sunlight has converted the lignin into a product which dissolves readily in 1% caustic.

Additional information has been obtained in this series of experiments on changes in acidity as the result of fading in sunlight, for the pH of the water extract of the original sheet was 3.83 but in the exposed sheet it had fallen to 3.5. This is further reflected in the change in total acidity, which was only 0.19% (as SO_3) in the original sheet but had increased to 0.92% in the exposed sheet. It seems probable from these observations that the rate of loss in the strength of a groundwood sheet on exposure to sunlight would become progressively greater as the exposure continued; likewise, the rate of loss in the permanence of the groundwood sheet would also become progressively greater as the sheet aged as a result of the building up of acid residues in the sheet.

One further fact of interest is found in the determination of uronic acid. It is evident that oxidation actually has taken place with the resultant formation of carboxyl groups, for the carbon dioxide evolution as carried out in the uronic acid determination increased from 0.5% to somewhat more than 1% in the aged sheet. This evolution of carbon dioxide has been shown by Heuser and Stöckigt (*Cellulosechemie* 3, no. 5:61-76, 1922) to be characteristic of oxycellulose and is not exhibited by the hexoses, hydrocellulose, or cellulose. These authors showed that the carbon dioxide evolution of ocycellulose prepared by the action of nitric acid on cellulose was about 1%. In unpublished work at The Institute of Paper Chemistry (Glading, R. E., 1938), an oxycellulose was prepared from cotton cellulose which was found to yield 1% of carbon dioxide; the rag stock was boiled with normal potassium dichromate (pH 1.4) for one hour. The original stock before oxidation yielded 0.3% carbon dioxide. This particular sample of oxycellulose was found to have a copper number of 19. Reasoning by analogy, it would seem as

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Yes, he is dry, all right. But he has no "guts." They removed every trace of moisture from his tissues, wrapped him in bandages soaked with asphaltum and left him to bake in the desert atmosphere for a few thousand years. It was a slow process and the finished product had no commercial value.

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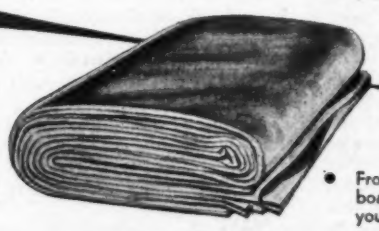

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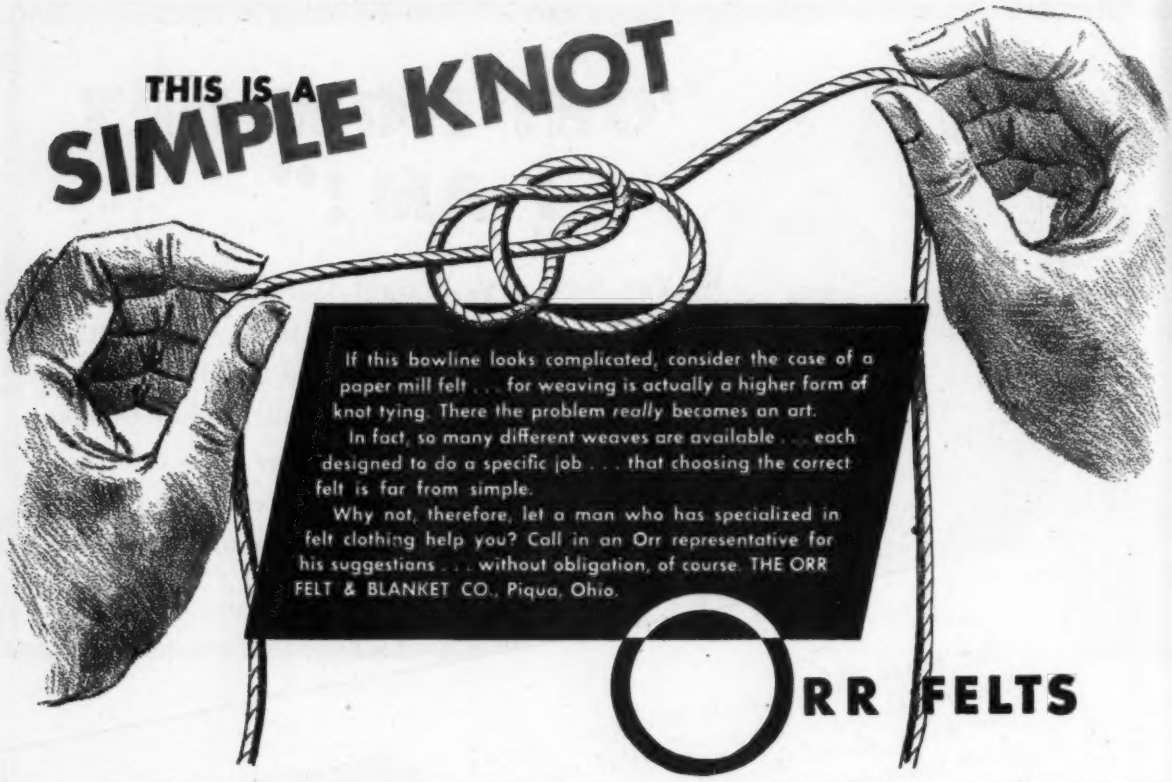
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though the carbohydrate in the groundwood sheet were being converted by sunlight into typical oxidation products, analogous to the oxycellulose formed in the dichromate oxidation of cotton cellulose.

It is evident from a study of these various analytical figures that the fading of a groundwood sheet involves a complicated series of reactions. Not only is the lignin changed but the carbohydrate portion of the sheet is also modified.

IV. A Search for an Inhibitor to Prevent the Fading of Groundwood

EDWARD A. REINECK[1] and
HARRY F. LEWIS[2]

In view of the fact that the fading of groundwood, particularly in the presence of light, is at least in part an oxidation reaction, one point of attack on the problem of the control of fading has been a search for an antioxidant which in small concentrations might prevent fading .

The use of inhibitors in connection with petroleum products, rubber, and related industries has been extremely successful but, unfortunately from the standpoint of the transfer of knowledge and the application of experience, the actions in most cases are specific. Compounds which stabilize rubber against embrittlement will not of necessity stabilize hydrocarbon oils against gum formation. Little information is available which would support the hypothesis that the fading of groundwood is comparable with the oxidation of rubber and petroleum hydrocarbons or that indicates those compounds which might act as antioxidants or inhibitors to stabilize groundwood against fading. Because of this fact, it has been necessary to follow the Edisonian approach to the problem. A study of this character is of necessity time-consuming and often lacking in the hoped-for result.

In all, 130 compounds from seven general classes have been investigated, as well as a number of miscellaneous substances. The classes include the phenols; acids, esters and salts; amines and substituted amines; aldehydes, alcohols, and ketones; chlorinated compounds; carbohydrates; nitro compounds; and miscellaneous compounds.

In reviewing the results obtained with the various compounds, the outstanding fact noted is that in no case among the large number studied was the aged brightness of a treated sheet significantly higher than the aged brightness for the blank. On the surface, this would suggest that the compounds tried were ineffective in controlling fading. Many of the compounds, however, cause a color loss in the groundwood sheet without any aging, and in some cases the action of the light is to brighten the sheet, possibly because of a bleaching of the added chemical. This masks the possible action of the compound as an antioxidant under the condition of test and, therefore, it has been necessary to extend the tests in certain cases.

One of the compounds of this type is dimethyldihydroresorcinol. The sheets treated with this reagent lost only 2.2% brightness, whereas the control lost 5.1%. A number of other compounds likewise showed smaller brightness drops than the control, although the ultimate aged brightness was always below that of the control. In order to determine the effectiveness of these compounds, it was necessary to expose a number of them for a six-hour period.

Even after an exposure of six hours, the final brightness of the untreated sheet in every case was equal to or better than the treated sheet, and it must be concluded that the treatments were unsuccessful in even delaying the "fading" reaction.

Because the pH of the sheet might be related in some degree to the effectiveness of the added chemicals, a number of sheets were made up with dimethyldihydroresorcinol buffered to various pH values through the use of acids and alkaline salts.

Again, however, the exposed control sheet was as bright as any of the treated sheets.

A similar series of tests were run with *o*-aminophenol.

Since the brightness changes are so small after aging the dimethyldihydroresorcinol- and *o*-aminophenol-treated sheets for one hour, it seemed desirable to determine whether, after a long period of aging, the control would still be brighter or whether it was losing its brightness at a more rapid rate than the treated sheets. Handsheets made up with these chemicals were exposed for periods up to 20 hours. Again, the controls were found to be as bright as the treated papers, even after aging for 20 hours.

It must be confessed that the fading tests with the various antioxidants have

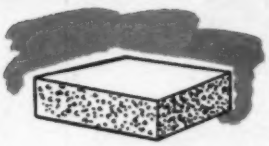
[1]Research Assistant, [2]Research Associate, The Institute of Paper Chemistry.

how TO BUILD AN ACID-PROOF FLOOR THAT WILL STAND UP EVEN UNDER ABNORMAL CONDITIONS

THE PROBLEMS involved in corrosion-resistant floor construction are so many and so varied that it is small wonder that such floors are a source of so much trouble to engineers and maintenance men alike.

The procedure outlined below, based on our experience of 80 years in handling corrosive problems, will give a floor of proven durability and economy — a floor that will stand up not only under traffic loads, but under exposure to oil, water, acids, alkalies, and solvents and is reasonably resistant to thermal and impact shock.

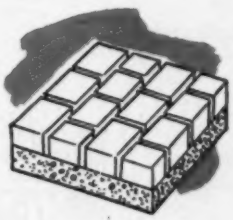
1st Start with a rigid, solid base. The ideal base is rigid concrete, 3" to 4" thick, even thicker, if traffic conditions are severe.



2nd Cover the concrete base with several layers of tar paper. All posts, curbs, drains, etc., should be carefully flashed in—just as carefully, in fact, as if you were preparing a roof.

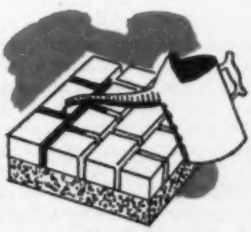
3rd Mop the entire area with either U. S. Stoneware's Resilon or U. S. Stoneware's Calktite. Both are applied hot (about 200°F). Don't be stingy, use plenty of Resilon or Calktite. Cover the entire area to a depth of approximately ⅛". Remember, this membrane is designed to prevent sub-surface seepage. Prepare it carefully.

4th Lay the floor with "U. S." Acid-proof Ceramic or Carbon Brick*, allowing ¼" joint space between the brick, and place the roughened non-skid surface out. Thickness of the brick depends on traffic conditions—for light traffic the minimum should be 1⅛", for heavy duty traffic 2¼". It is rare that more than one course is required.



**Carbon brick if hydrofluoric acid is present. Some sacrifice in wearing qualities must be anticipated.*

5th Bond the acid-proof brick with a good sulphur-base cement such as Portite, Super-Portite, or Carbo-Portite, by pouring the cement (hot) into the joints. If a sulphur-base cement will not resist the particular corrosive conditions in your plant, fill the joints only to within ⅜" or ½" of the top, then point the joints with Durisite, an acid, alkali and solvent-resistant resinous cement.



It is important to remember that even with time-proven design, the ultimate life of the floor depends on: (1) careful workmanship, and (2) the best materials. The U. S. Stoneware products recommended for use: "U. S." Acid-proof ceramic or carbon brick, Resilon, Calktite, the Portite series of sulphur-base cements, and Durisite acid-and-alkali-resistant resinous cements, are recognized as tops in their respective fields by chemical engineers everywhere. They are backed by a reputation built through 80 years of service to the chemical and allied industries. All materials mentioned are available for immediate shipment.

If you will send us your floor measurements with information regarding corrosive and service conditions, we will be glad to recommend the specific materials best suited and enumerate the items required.

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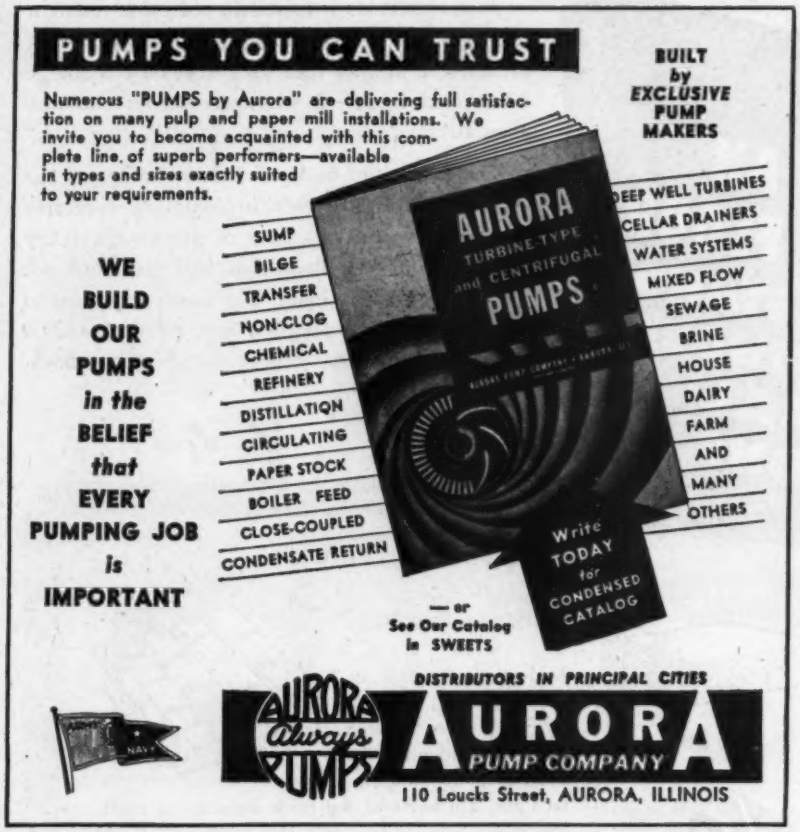

been almost entirely negative, at least as regards the finding of any single compound or type of compound which retards the fading of a groundwood sheet after a long period of exposure to ultraviolet light.

In spite of this, the search for such compounds should not be given up, for the evidence presented earlier points to oxidation as playing some part in the fading reaction. Successful antioxidants in connection with other industries have been found only after the investigation of many hundreds of compounds, and the possibility exists that, to date, we have not run across the particular compound or type of compound giving the key to the situation.

In this connection, there are three United States patents (2,060,733, 2,086,418, 2,086,419) assigned to the E. I. du Pont de Nemours & Company, Inc., by Hunt and Latham, dealing with a process of treating cellulose and derivatives of cellulose to stabilize the material against oxidation.

United States patent 2,086,419 describes the use of stabilizing agents, such as organic and inorganic thiocyanates, for retarding the deterioration of cellulosic bodies in the presence of ultraviolet light.

In view of the above, groundwood and 50-50 groundwood-bleached sulphite handsheets containing 5% ammonium thiocyanate were exposed to sunlight for 24 hours on each side; no changes in physical characteristics before and after fading were observed.

The only physical characteristic seemingly improved is that of fold in the groundwood-sulphite sheets where the treated sheets retain 75% of their folding strength after exposure, whereas the untreated sheets retain only 65%—this difference is not sufficiently great to indicate undue significance.

One of the possible explanations for the failure of the antioxidants used was that an induction period had set in in the pulp before the paper was made. To determine whether they would be effective if added before the induction period, the following experiments were undertaken.

In order to obtain a fresh wood surface in which oxidation had not already set in, green spruce pulpwood was sawed into 1-inch slabs and one side of the slabs planed. This operation was carried out in the dark to prevent a photochemical oxidation from being initiated before the retarder was added to the wood. Solutions of various materials were applied to the smooth surface of the slabs and were allowed to air dry. The treated slabs were exposed to the sunlight. One group of reagents was added in a concentration of 0.1% on the weight of the wood; the other, 0.5%. The first group was aged in sunlight for 4 days (25½ hours); the second group, for 2 days (17½ hours).

There was no real improvement in any case, all of the samples being considerably darker than the unaged wood. Spectral reflectance curves also showed no improvement in making the wood resist the color change attendant on exposing it to ultraviolet light.

It would thus appear that the above chemicals do not act as inhibitors of the photochemical fading of groundwood.

V. Inhibition of Fading through the Use of Ultraviolet Absorbing Compounds

PHILIP A. NOLAN, Research Associate, The Institute of Paper Chemistry (Now serving in the U. S. Navy)

The use of the following compounds of high ultraviolet absorption and high efficiency of fluorescence for the purpose of reducing fading of groundwood has been investigated: Fluorescent purple (National Aniline Company), Eastman ultraviolet sensitizing solution, Eastman diethyl

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dihydrocollidinedicarboxylate, and calcium tungstate. The fluorescent purple dye is being used commercially for obtaining brighter and whiter sheets in the field of white papers. The Eastman ultraviolet sensitizing solution is used for sensitizing photographic plates for high speed ultraviolet photography. Calcium tungstate is a well-known substance of high fluorescent efficiency. The results of each type will be discussed individually.

The first experiments involved the measurement of the ultraviolet spectral reflectance curves for dyed and undyed handsheets of bleached sulphite pulp for the purpose of determining the ultraviolet wavelength range in which the dye effectively absorbs light. The curves reveal that the amount of light absorbed by the dye is small at 310 mmu, the wavelength most effective in fading groundwood.

Similar tests were run on dyed and undyed handsheets of 100% groundwood pulp. These curves indicated a maximum absorption for the fluorescent purple at 350 mmu. Furthermore, the absorption coefficient of the dye decreases rapidly from 350 to 300 mmu, which checks with the first experiment in indicating unsuitability of fluorescent purple for reducing the fading of groundwood.

In spite of this, a number of further experiments were run, which are described briefly in order to complete the record.

One set of groundwood handsheets was dipped in an alcohol solution of fluorescent purple and a second set was made from beater dyed stock. There was no appreciable difference in the rates of fading of the natural and the dipped sheets.

Beater-dyed samples were made using the following weights of dye: 5, 10, 100, and 500 pounds of fluorescent purple per 1,000 pounds of groundwood stock. These weights of dyeing are economically impracticable, but it was desirable to study what difference in initial brightness and rate of fading could be measured on the dyed sheets. The percentage retention of the dye was measured for the 10-pound dyeing and found to be 60%.

There was no difference in the rates of fading of the 5- and 10-pound dyeings and the natural sheet. The reflectances in the visible range for the 100- and 500-pound dyeings were lower by 3.0 and 6.8 points, respectively, than that of the natural pulp. All the dyed sheets, except the 500-pound dyeing, showed the same decrease in brightness on fading as did the natural sheet. The decrease in brightness for the 500-pound sheet was less than that for the natural sheet, but the difference was not significant.

A 100% rag sheet was dipped in an alcohol solution of the fluorescent purple dye and subjected to the normal fading test for a period of 16 hours. The spectral reflectance curves indicated that the dye fades appreciably; however, the rate of fading is lower than observed for the untreated groundwood.

The results obtained from the use of the Eastman ultraviolet sensitizing solution as the ultraviolet-absorbing compound are as follows: The rate of fading of a groundwood sheet dipped for 30 seconds in the active solution is less than that of the natural sheet. The natural sheet required an exposure of 6 hours to decrease the reflectance by 12.1 points, whereas the dipped sample required a 12-hour exposure for the same decrease. In spite of the originally lower measured reflectance of the dipped sheet, it appeared visually brighter and whiter than the natural sheet when viewed in daylight. Handsheets were sprayed with the Eastman ultraviolet sensitizing solution by means of a small atomizer. The results of the fading tests indicated that the sprayed sheet required an exposure of 17 hours to cause the same decrease in reflectance of 8.7 points that the natural sheet showed in an exposure of 3.5 hours. It was observed in this case that the sprayed sheet appeared much brighter than the natural sheet when they were viewed either in artificial light or daylight.

Tests were then made on fading of the 100% rag sheet with the ultraviolet solution. These data indicated that there was no appreciable fading of the ultraviolet sensitized coating which could be associated with the fading of the compound itself.

Diethyl dihydrocollidinedicarboxylate was dissolved in benzene and sprayed on a groundwood handsheet. The sprayed, unfaded sheet had a brightness 6.5 points higher than that of the untreated sheet. However, the visual brightness of the sprayed sheet differed more from that of the untreated sheet than was indicated by this measured difference in brightness. This latter fact is associated with the extremely high efficiency of fluorescence of the compound and with the formation of a crystalline coating on the surface of the groundwood sheet. Fading tests indicated that the reflectance of the sprayed sheet decreased more rapidly than that of the untreated sheet. In order to account for this difference, in spite of the high ultraviolet absorption of the compound, a layer of the compound was sprayed on a glass surface. This sprayed surface was then subjected to the normal fading test; the brightness decreased by 23 points during an exposure of 24 hours. This observation eliminates the possibility of using this compound.

Calcium tungstate fluoresces efficiently in the extreme violet and possesses a high ultraviolet absorption coefficient. A solution of this compound was sprayed on the groundwood sheet; no difference between the rate of fading of this sheet and the treated sheet was observed.

A cellophane which is used as a preservative wrapping for foods absorbs practically all of the ultraviolet radiation below 400 mmu. A natural groundwood sheet was covered with a layer of this film, and normal fading tests were made; no change in brightness was observed for the covered groundwood sheet. This observation prompted consideration of the use in a groundwood sheet of the ultraviolet-absorbing compound present in the cellophane. The manufacturers of the cellophane stated that 1-naphthylamine-4, 8-disulphonic acid was being used but, in place of this compound (which they did

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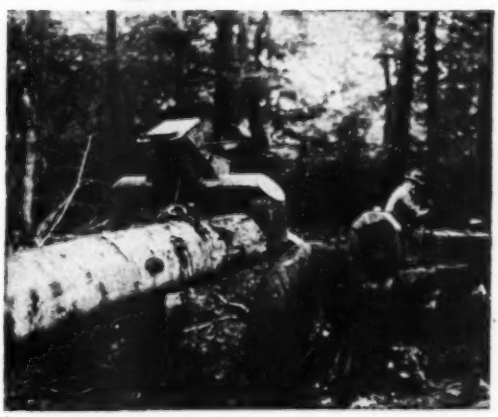

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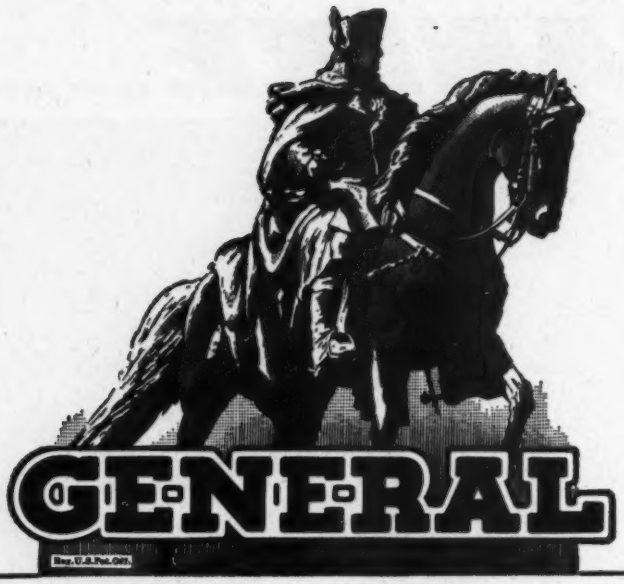

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not manufacture), they suggested the use of amino G salt. Groundwood sheets were both dipped and sprayed with amino G salt and it was found that the treated sheets faded more rapidly than did the untreated sheets. As was observed with diethyl dihydrocollidinedicarboxylate, experiments indicated that the amino G salt itself was responsible for a more rapid decrease in reflectance upon exposure of the sheet than was observed for the untreated groundwood. In the communication from the manufacturers of the above mentioned cellophane, reference was made to two patents (U. S. patents 2,129,131 and 2,129,132, Sept. 6, 1938) on the use of various ultraviolet absorption compounds as filters for the preservation of packaged foods. The only compound of those listed in the patents which has been tested is 1-naphthylamine-3, 6, 8-trisulphonic acid, although a large number of closely related compounds have been studied and described. 1-Naphthylamine-3, 6, 8-trisulphonic acid is of no value for decreasing the rate of fading of groundwood because of the development of a brilliant yellow color caused by reaction of the acid with the groundwood pulp. Additional experiments should be carried out with other compounds described in the cited patents.

Another class of compounds with high ultraviolet absorption coefficient was studied. These included both sodium and calcium lignosulphonates and methanol lignin. The reasons for the choice of these particular compounds were: (a) various observations had indicated that they were stable to light and (b) data on the ultraviolet absorption coefficients of lignin compounds indicated that they should have the ideal absorption coefficient for the elimination of fading in groundwood, if the hypothesis is correct that lignin is responsible for the observed fading. Sheets were dipped in a water solution of commercial sodium lignosulphonate neutralized by hydrochloric acid. The original brightness of the unfaded sheet was 11.4 points lower than that of the untreated sheet, and the decrease in brightness resulting from the exposure of the samples was much more rapid than for the untreated sheet. A groundwood sheet was dipped in a dioxane solution of methanol lignin and exposed for 18 hours. The spectral reflectance curves indicate that the initial rate of decrease of reflectance of the treated sheet is less than that of the untreated sheet.

Wartime Picture of the Swedish Pulp and Paper Industry

EDWIN C. JAHN, Professor
New York State College of Forestry,
and Research Collaborator,
U. S. Department of Agriculture

Swedish economy as a whole—not only the forest industries—is based upon world trade. The economic isolation which the war has forced upon the country by cutting off the great bulk of her exports and imports has caused Sweden to turn her efforts to a program of self-sufficiency for both military and civil needs. Since wood is her principal raw material, she has en-

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deavored to base as many domestically needed products as possible upon the forests. The pulp and paper industry contributes greatly to the war-time industrial needs of the country.

Sweden can consume only a minor fraction of the pulp she produces for her population is only about 6.5 million. Examination of the prewar Swedish pulp markets shows that the average deliveries of chemical pulp including viscose for 1936-39, were divided as follows:

Domestic	3%
Other transatlantic markets	10%
Europe, excluding United Kingdom	27%
United Kingdom	18%
United States	42%

These figures show the grave situation in which the Swedish pulp industry was placed by the German invasion of Norway, April 9, 1940, with the resultant blockade of the Skagerack. Swedish prewar capacity was about 1.5 million metric tons of sulphite and 1 million metric tons of sulphate pulp, not including pulp made for direct conversion to paper.

The Finnish pulp and paper industry has been adversely affected by the war. The industry during the war has been beset by acute labor shortages in the mills and in the woods, high cost of wood, fuel problems, shortage of replacement parts, packing, paint, etc., and, of course, greatly reduced markets. Pulp and paper manufacture is Finland's greatest industry and in 1938, the value of its pulp and paper exports was 41% of the total export value for Finland. In 1938, Finland produced 830,000 metric tons of sulphite and 565,000 metric tons of sulphate. The war, through territorial losses, has resulted in a decrease in capacity from a prewar figure of 1,850,000 down to 1,480,000 metric tons. Pulp mills have been operating at very low capacity during the war; about 25 to 30% during 1943. Kraft paper production, however, was high because of wartime demands for sacks, wrapping, and spin paper.

During the war there has been no extension of pulp production capacity in either Sweden or Finland. However, shifts in the types of pulp that can be produced have occurred in Sweden, by the building of new bleaching plants and additions to others. This change was stimulated by the growing viscose demand just prior to the war and during the early war years, and more lately by anticipations for postwar trade.

The principal trends of the pulp and paper industry during the war are: (1) greater emphasis on bleached sulphite and sulphate pulps; (2) production of viscose pulp; (3) manufacture of kraft spin papers; (4) expansion of domestic paper market, and (5) byproduct development. The latter is based on tall oil products, organic chemicals from sulphite alcohol, and cellulose derivatives.

The pulp industry, despite the loss of the greater part of its original markets, maintained pulp production at about 50% of its prewar level during 1940-42. This was due to (1) the production of fodder cellulose; (2) the increased export of viscose pulp to continental Europe, particularly Italy and Germany; (3) the improved domestic market for kraft and newsprint; and (4) the demand for kraft spin paper in Europe for making twine and woven sacks. However, during 1943, the picture changed. The emergency requiring fodder cellulose for cattle and horses disappeared, the Italian viscose market was lost, and German purchases gradually declined, e. g., Germany purchased less than half the amount of viscose pulp during the last year of 1943 than she could have under the trade agreement. As a result of these market losses, pulp production during 1943 was around 35% of capacity. During the present year, the export situation continued to deteriorate. Now exports to Germany have virtually ceased and there are only limited shipments by safe-conduct boats. Finnish production in 1943 was only about 25 to 30% of capacity.

Because of the severe climatic conditions during 1940 and 1941 which coincided with the war blockade of Sweden, the Swedish dairy and stock industry was in dire straits. To meet the emergency, the pulp industry was called upon to produce a special digestible type of pulp for animals. The Swedish government purchased the entire amount which was about 1 million metric tons. Fodder pulp was made by both the sulphite and sulphate processes using conditions to produce an overcooked soft pulp. The dry pulp sheets were disintegrated. The fluffy pulp was packed in paper sacks, at the same time adding a little molasses and salt. Most of this pulp was made during 1941 and 1942 with only about 130,000 metric tons being made during 1943 to fill uncompleted contracts. The quality requirements of these final amounts were changed so that the pulp can be used for paper, if no emergency arises necessitating its use as fodder. Fodder cellulose is still made in Finland and Norway.

As already mentioned, viscose has been Sweden's main war pulp export. The development of a growing staple fiber (cell wool) industry in Europe, particularly in Italy and Germany, led to increased production of viscose pulp, so that in 1938 over 200,000 metric tons were exported. The peak export year was 1942, with over 300,000 metric tons exported. The capacity for producing viscose pulp, however, kept expanding and now is estimated to be nearly 550,000 metric tons. Production at this capacity has never been realized since many of the extensions made in 1943 were completed after the outlets for viscose had considerably decreased, mainly by the loss of the Italian market.

There is great interest in high alpha pulps and considerable research development is underway to produce special pulps for esters and ethers. There is a small domestic tonnage for viscose (15,000) and for nitration pulp. Both sulphate and sulphite are being made for nitration.

Since a much larger share of the paper production goes to the domestic market than in the case of pulp, the paper industry has maintained a better position during the war. During 1942 and 1943, it operated at about 60% capacity but has fallen off a few per cent during 1944. In normal times, Swedish paper exports are

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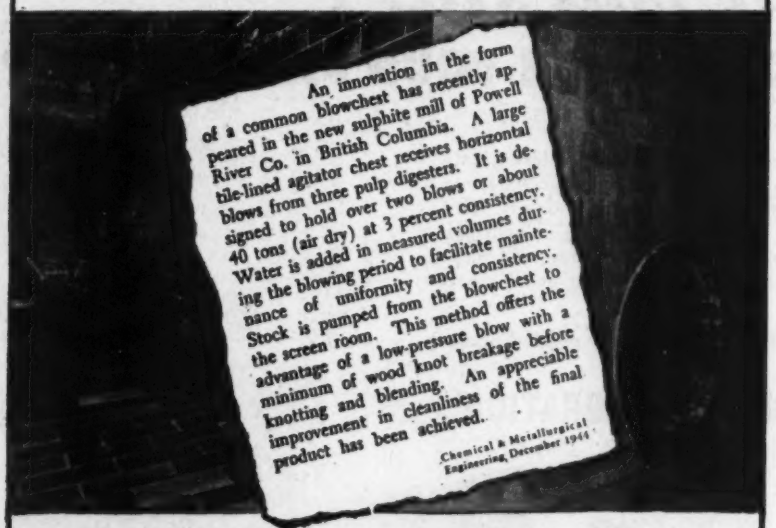
An innovation in the form of a common blowchest has recently appeared in the new sulphite mill of Powell River Co. in British Columbia. A large tile-lined agitator chest receives horizontal blows from three pulp digesters. It is designed to hold over two blows or about 40 tons (air dry) at 3 percent consistency. Water is added in measured volumes during the blowing period to facilitate maintenance of uniformity and consistency. Stock is pumped from the blowchest to the screen room. This method offers the advantage of a low-pressure blow with a minimum of wood knot breakage before knotting and blending. An appreciable improvement in cleanliness of the final product has been achieved.
Chemical & Metallurgical Engineering, December 1944

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appreciable; in 1937 they were 68% of the production, the latter being 840,000 metric tons, not including board.

The best production is being maintained by the kraft (80%), fine papers (70%), and newsprint mills (60%).

The kraft paper mills have been doing moderately well during the war due to the need for sacks for charcoal and wood for motor vehicles, the demand for spin paper, and the requirements of the rearmament program. The charcoal and sack business has been a large one for about 75,000 vehicles operate on solid fuel.

A great deal of strong, tough M. G. kraft, having a breaking length of about 12,000 meters, is being made. This is cut into 8 mm. widths and spun into binder twine for harvesting, ordinary twine, and woven into sacks for potatoes, grain, and seed and into cloth for sugar filter presses, and for furniture and carpet foundation. In Finland, it is also used for vests and heavy curtains. Germany has bought appreciable quantities of this paper, 68,000 metric tons being delivered in 1943.

For the usual kraft pulps, the pulping procedure remains essentially unchanged. The cooking cycle is about 6 to 7 hours, with one or two gassing steps before maximum pressure is reached. The time to maximum pressure is 3 to 4 hours, and the time held at this pressure is 0.5 to 1 hour. The maximum temperature is 165 to 170 C. The added liquor is warm, about 55 C., and is heated during the initial circulation up to about 96 C.

Drainage and washing in the diffusers is done in four stages in most cases, only the last going to the river. A new compact diffuser unit with central control and a quick emptying device has been installed in at least one mill.

Circulation and indirect cooking are common digester practice. All mills claim great advantages in capacity per digester, chemical savings, and time savings, by chip packing devices. One mill stated that they get an equivalent of 30 cooks per day after installing chip packers as against a previous 24.

Salt cake consumption is low, the average figure given being about 200 pounds per ton of pulp. Some mills claim figures much less than this.

The Jönsson vibration screens are coming into quite wide use in both sulphite and sulphate mills for the initial screening stage. These have a very high capacity—one 50,000-ton mill has two screens. Some mills bleaching kraft also use some type of fiber fractionator for special pulps.

The low capacity of operation during the war has resulted in a slower tempo in sulphite pulping. The cooking cycle, drainage and washing times have been increased. Plenty of time is allowed for drainage in order to get the maximum recovery of waste liquor for alcohol fermentation.

The wood generally comes to the mill in 3-meter lengths and is piled and stored 8 to 12 months. Great care and selection are exercised in the barking and cleaning of the wood.

An apparatus has been developed by N. Kanto of Finland for fractionating chips into prime and second qualities. This is based on the principle that the heavier and chunky-shaped knots fall faster from an inclined plane than well-formed chips which have greater air resistance. This principle makes it possible to separate the chips into two grades by dividing a wide falling stream of chips with a long steel wedge. A Swedish mill has this device in operation for about two years and there are two installations in Finland.

Pyrites is the principal source of sulphur for making acid. A fine pyrite dust having 50 to 52% sulphur is obtained by

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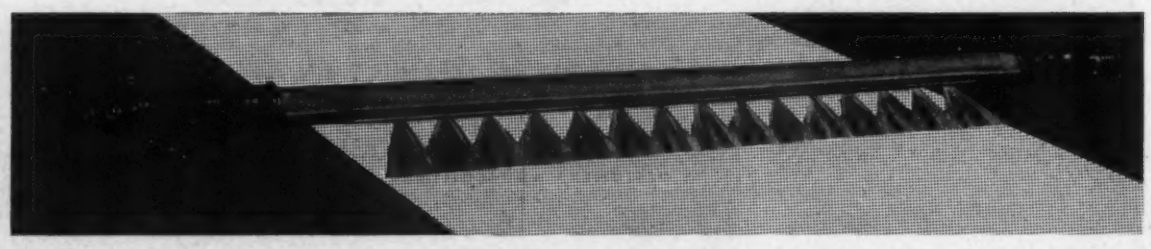

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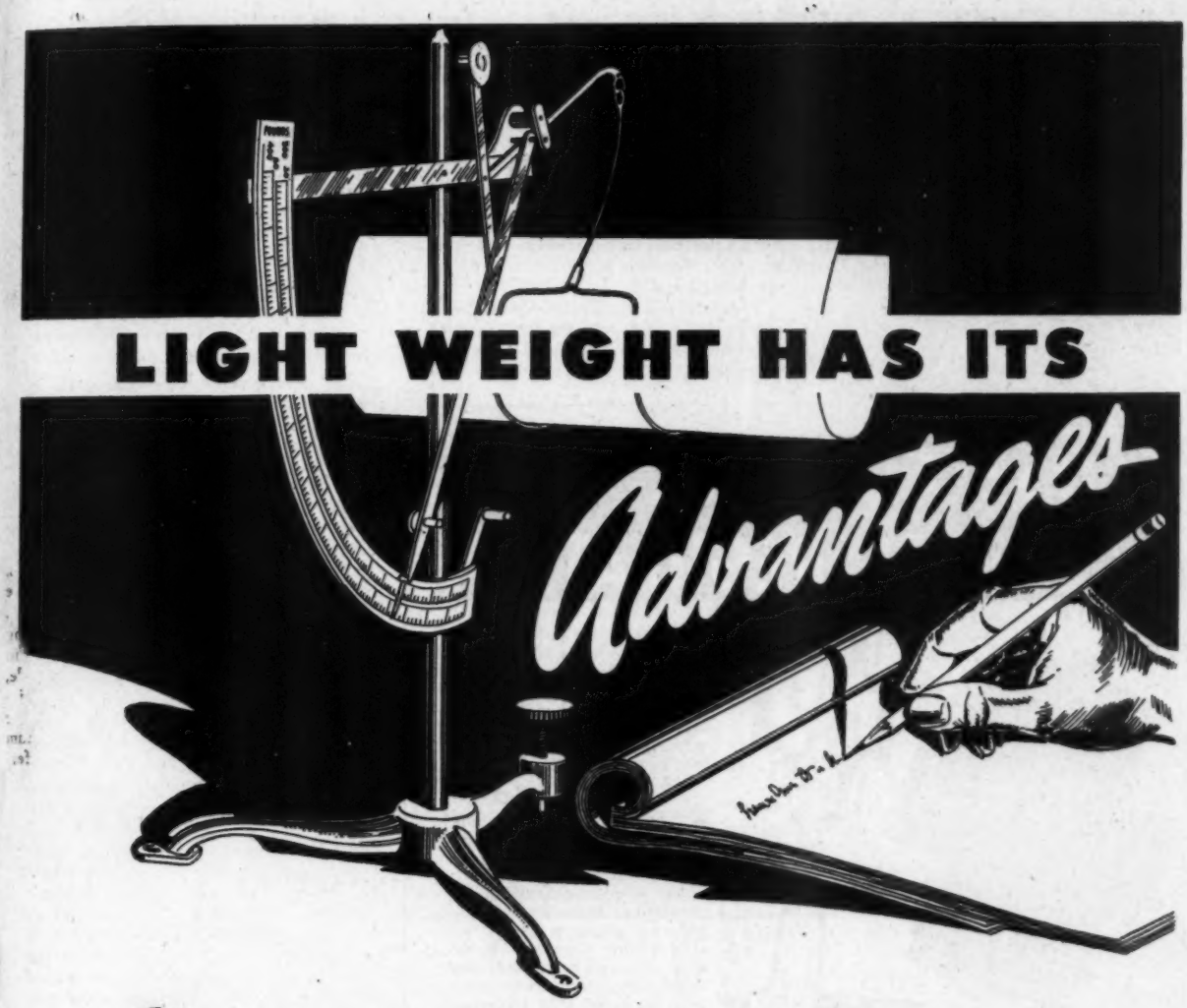

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the flotation of pyrite ores. In most cases, the gas passes both through a water scrubber to remove sulphur dioxide and Cottrall precipitators to remove dust composed of iron oxide, arsenic and selenium compounds. About 90% of the sulphur is recovered as sulphur dioxide.

The acid from the towers is taken to a low pressure tank and then to a high pressure tank. Here the acid is brought up to strength and its temperature raised by the digester relief gases, with the excess gases going to the low pressure tank. The acid is brought to the digester at 60 to 80 C., and has 5.5 to 6.0% total sulphur dioxide.

The cooking conditions vary greatly according to the type and quality of pulp produced. The great majority of mills have digesters equipped with a circulation system. The heating may be either direct or indirect. Generally speaking, the cooking temperatures for unbleached and strong sulphites are 125 to 135 C. and for viscose pulps, 142 to 145 C., and the cooking period 14 to 16 hours, and 11 to 14 hours, respectively. For bleached pulps, the cooking is closely integrated with the bleaching operation to produce the desired quality.

There is no standard construction of bleach plant and no standard practice. Each mill has its own innovations in plant equipment design and in technology. The operation is multistage and most plants combine towers and Bellmer-type bleachers in various arrangements.

There are two different schools of thought on kraft bleaching. One prefers to begin with an oxidative bleach, i. e., hypochlorite, and the other prefers a heavy chlorination at the start. The final stage is hypochlorite, if not followed by chlorine dioxide.

Some mills screen or otherwise fractionate viscose and dissolving pulps with special equipment to eliminate ray and epithelial cells and fines. The resin content of the pulp is very considerably reduced by eliminating the fine material.

New developments have been made in the evaporation of both sulphite and sulphate waste liquors. Several systems are in operation for evaporation of sulphite liquor and the gaining of the calorific value of the organic matter and eliminating the disposal problem. One is based on multiple-effect evaporation, another on the combination of multiple-effect evaporation and stack gases, and a third uses the Ramen stack gas system.

There are three systems for evaporating sulphate waste liquor; one using stack gases (Ramen) and expansion vessels, another using stack gases over rotary discs (Nyquist), and the other using superheated steam (Bergstrom-Trobeck). One mill combines the evaporation of sulphite and sulphate liquor. The mills having these systems in operation make good claims for them as to efficiency, costs, heat return, and chemical recovery.

The byproducts of the sulphate pulp industry are sent to one of three plants for refining. The total capacity is about 15,000 to 17,000 metric tons of raw tall oil. Each plant uses a different system for refining but the main products are the same, namely, rosin, pitch, soft and hard soap, and fuel oil. There are also produced insulating cable oil, sulphonated oil for the textile industry, and other products.

Active research is being pursued on the elimination of tall oil odor, on hydrogenation for high grade soaps, on the preparation of drying oils, and on sharper methods of separating the rosin and non-saponifiable contents.

Some of the pulp companies are greatly interested in cellulose derivatives. There is a small production of cellulose glycollate ether and of ethyl ethers. The glycollate ether is water soluble and used for adhesives, particularly for wallpaper, for textile sizing, and to give body to various types of food. Water and alcohol soluble ethyl ethers are made.

Besides viscose pulp, nitration pulp is manufactured by both the sulphate and sulphite processes. A small staple fiber industry has started in Sweden and there are two plants with a combined capacity of about 12,000 tons. The cellulose derivative development is aimed only for the domestic market.

The demand for chemical products formerly imported has led to an active development of byproducts. One of the most impressive of these is the building up of an organic chemical industry based on sulphite alcohol. Thirty-three sulphite mills now have alcohol plants, and the

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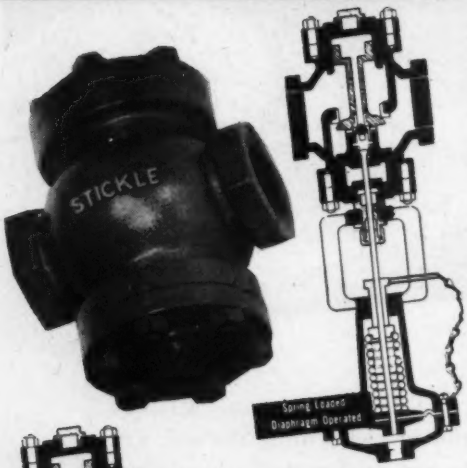

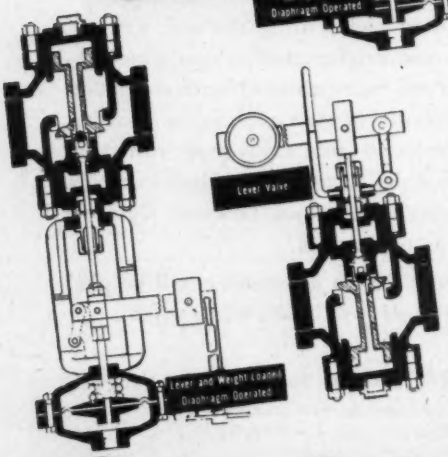

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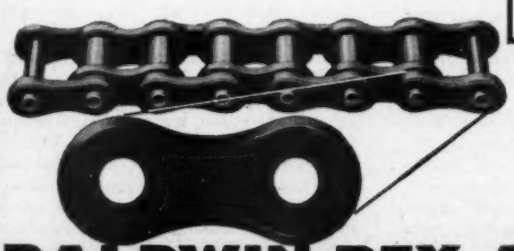

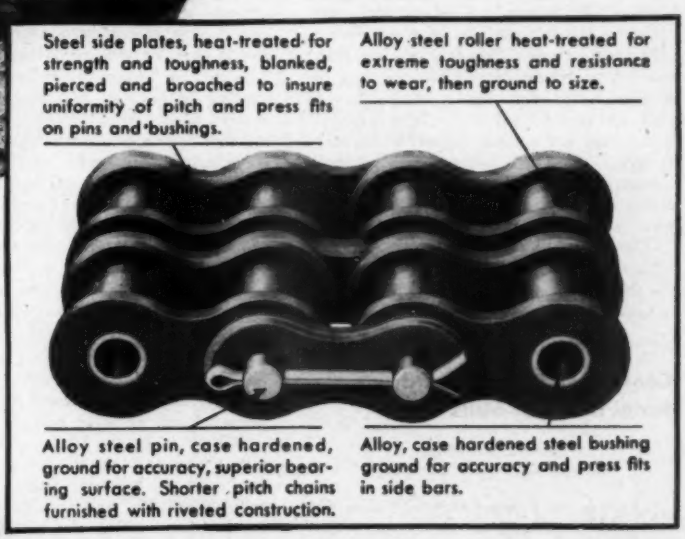
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total annual capacity is about 120 million liters of 95% alcohol. Unfortunately, because of the low activity of the sulphite industry, the production is much less than this figure. Some of this alcohol goes to distilleries for drinking spirits, some is used for motor fuel, but a large amount is the base for organic industrialists, such as glycol and its derivatives, butanol, crotonaldehyde, ethyl and butylacetates, chloracetal, etc. This chemical development is a part of the pulp industry.

The Swedish pulp and paper industry is ready to resume world trade as soon as the Nazi war ends. The pulp industry has its storage capacity filled. The estimated chemical pulp on hand early last summer was about 550,000 metric tons, and now it is estimated nearing 700,000 metric tons, by storage on boats.

A number of companies have built large modern laboratories, and others are under construction. Also, a large wood research institute is being built in Stockholm. This is financially supported by the pulp and paper industry, the wallboard industry, plywood manufacturers, the wood exporters association, and the Swedish government. This intensive research activity is part of the program to keep and improve the Swedish pulp and paper industry's position in postwar world markets.

Control of Bacteria and Fungi in Paper Mills

LEO J. RAMPEL
Rampel Chemical Company

There is not a paper man who does not recognize slime and its appearance. But its constitution is variable. Some like Fritz (*Pulp Paper Mag. Canada* 31:99, January 22, 1931), believe that it usually consists for the most part of "filamentous fungi of the mold type that form a matted tangle in which bacteria, yeasts, algae, and unicellular animals frequently develop." Others, like Beckwith (*Pacific Pulp Paper Ind.* 5, no. 8:23-26, July, 1931), believe bacteria to be the primary cause of slime, forming a mass in which fungi, algae, and foreign matter may become entangled. Sanborn (*Tech. Assoc. Papers* 24:437) in his experiments even found protozoa and related forms in slime but not worms.

Whatever be the nucleus, it is universally recognized that slime is a heterogeneous mass of bacteria, fungi, algae, unicellular animals, and foreign matter that have entered either the water system or the paper mill and developed under favorable conditions. This development has often become so complicated and diverse that the original factor has been overshadowed by secondary causative agents.

The exact composition of this heterogeneous mass varies from mill to mill; however, usually a few common organisms repeatedly occur. These have been briefly described by Martin and Griffin (Microbiological control in pulp and paper manufacture, Research Publication 472. Wallace and Tiernan Co.) and Forrester (*Pulp Paper Mag. Canada* 41, no. 2, 1940) and Kirby as: Filamentous iron bacteria that form in the water supply lines and break away to clog strainers, spot paper, and simultaneously carry infection directly into the system. This type is an entrapping type which tends to enmesh other matter. Another fresh water microorganism is the filamentous fungi growths that, like the iron bacteria, adhere to the lines and break away to infect the system and overly cause trouble. These develop quite rapidly in the paper mill. Algae, on the other hand (discussed by Martin and Griffin) are grown mostly in the water supply system rather than in the paper mill where in the latter case temperature, pH, and light are not as favorable for their growth as for the other types of slime formers. The fourth main type of microorganism is the capsulated bacteria that rapidly grow in the paper mill system to form a conjested gelatinous mass occluding other organisms and particles.

The specific members of these general types vary from mill to mill but as King (*Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944) found, the most prevalent are *Aerobacter aerogenes* and the members of that family, *E. coli*, *B. coli*, *B. subtilis*, *B. mycoides Proteus vulgaris*, *Achromobater*, *Sulfurem*, *Crenothrix*, *Clodosporium* and several unidentified filamentatious mold types. These thrive under the mill conditions of a pH of 5 to 6. Appling (*Paper Trade J.* 119, no. 11:116-119,

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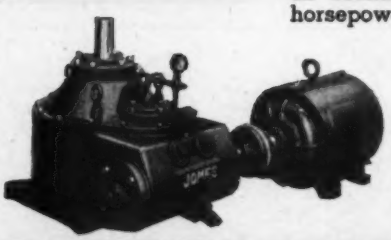

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September 14, 1944) selected for his studies *Aerobacter aerogenes* as the most prevalent microorganism. Another one of the commonest is *B. subtilis* found in dust, water, etc. This type is particularly difficult in paper mills because as Dr. Breed (*Tech. Assoc. Papers* 24) expressed, this microorganism has enzymes that attack felt fibers. At first, the actual protective sheath of the fiber prevents enzyme attack, but eventually this sheath is broken and the enzymes disintegrate the felt.

In selecting an effective measure for control of slime in each mill, the following are factors that must be investigated before the adoption of any measure:

1. Inhibiting concentration at which the chemical is effective.
2. Degree of selectivity.
3. Lasting effect.
4. Ease of handling, solubility, color, and odor of the chemical.
5. Toxicity.
6. Absorption of the chemical by the pulp to indicate the residue in the mill effluent.
7. Speed and degree of dilution of mill waste into the stream.

Chlorine as a slime control measure was to a large degree successful before the increased closed white water system. It was contained in the fresh water and also often added to the white water or at various other points in the system depending on the mill. However, with increased closure of the system, the rapidity of dissipation typifying chlorine's effectiveness precluded its continued use, for the white water tanks became breeding places for microorganisms of all types. To prolong the effectiveness of the chlorine reaction, ammonia was used in conjunction with this chlorine for the first time in 1915 for water purification. Whereas chlorine alone destroys 99% of bacteria in 15 minutes according to Baker (Slime control. American Paper and Pulp Association, Engineering Department, Pamphlet, pages 3-37, February, 1932), the addition of ammonia while inhibiting the efficiency for a period of time extends and prolongs the activity to reach a maximum efficiency in 5 to 6 hours instead of 15 minutes.

Chlorine and ammonia have been introduced at various points in the mill; i. e., the groundwood deckers, sulphite deckers, and paper machine white water as well as in the fresh water machine. Even this, while improving existing conditions, does not completely solve the problems. Both the chlorine and chloramine treatment have certain disadvantages that restrict their universal use in paper mills.

Chlorine and chloramine were tried in a closed system newsprint mill in Canada (Grant, *Pulp Paper Mag. Canada* 43: 89-93, 1942). The use of this combination was satisfactory if a residual of 0.1 p.p.m. free chlorine was maintained. However, in time corrosion and disintegration of parts occurred. The paper machines were brightened and other sections became pitted. Various adjuncts were added to the system but were rejected either because of their ineffectiveness or cost.

Another paper mill using this same chlorine method found it unsatisfactory because of the expense of replacing corroded parts. It was found that corrosion occurred at the intersection of the screens where the parts were welded together. A weekly replacement of approximately $1,000 worth of screens was being required. Furthermore, to maintain effective control, breakpoint chlorination was necessary which in this particular mill was too costly.

In certain western mills, the use of chlorine is unsatisfactory because, as King (*Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944) found, chlorine reacts with the western groundwood. He found that it combines chemically with lignin to about 30% of the pulp. The use of chlorine is satisfactory where there is a small amount of organic matter present but not when there is a large quantity of pulp. Also, in western groundwood usually a bleaching agent is necessary which reacts chemically, with chloramine.

Chlorine and chloramine treatment have been found to have the disadvantage of selective action in slime control. One mill found that although certain forms of slime were eradicated with the use of chloramine, an increase in tapioca slime occurred (King, *Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944). According to Baker (Slime control. American Paper and Pulp Association. Engineering Department, Pamphlet, pages 3-37, February, 1932) one mill reported that chloramine applied to white water was

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effective in eliminating slime near the point of application in the white water system but that farther down the line the slime condition increased even more than before chemicals had been used. Although chlorine and chloramine are widely and successfully used in many paper mills, there is still the quest for something of more universal effectiveness, less corrosion and greater ease of handling.

Heat, electrolytic introduction of metallic ions, and many chemicals have been tried. As King (*Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944) emphasized, heat inhibits bacterial growth when applied to groundwood, but it is carried over to the paper machine where it increases bacterial action. Electrolytic introduction of silver ions is satisfactory for clear water but not for groundwood.

Many different chemicals have been tried but with varying registered success. Copper sulphate is used to a limited extent but even with low concentrations some corrosion occurs. (Sanborn, *Tech. Assoc. Papers* 24:437). King (*Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944), from his studies, reports that a concentration of 150 p.p.m. was required to attain growth inhibition.

More recent developments have been in the use of phenol and mercury compounds that have been tried extensively.

Various forms of the chlorophenates have been tested in laboratory and mill application. King (*Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944) found that the concentration of sodium penta- and tetra-chlorophenates necessary to prevent bacterial growth increase was quite high in comparison with that of certain mercury compounds: 100 and 150 p.p.m. for sodium penta-chlorophenate and sodium tetra-chlorophenate, respectively, in comparison with certain mercury compounds that required a concentration of 5 p.p.m. to prevent growth increase. He also found that sodium penta-chlorophenate reacted with the groundwood stock as did most phenolic compounds.

The chlorophenates were applied successfully at a Canadian paper mill and enabled a greater closure of the white water system. However, it was found (Grant, *Pulp Paper Mag. Canada* 43: 89-93, 1943) that they tended to be selective in their action, eradicating certain types of slime but simultaneously effecting a reversal of the general slime picture. The mass changed from a rubbery composition to a gelatinous type that was more easily removed by mill washings. That mill in particular found that a combination of penta- and tetra-chlorophenates and two chlorophenolphenates eliminated the so-called tapioca slime but was ineffective against the *Oidium* and *Monilia*.

It was found in the above mill that the chlorophenates must be continuously applied and a residual must be maintained throughout the white water and stock systems.

In the above category also belongs chlorinated phenol.

The mercury compounds were first used by the mill discussed by King (*Pacific Pulp Paper Ind.* 18, no. 6:39-46, June, 1944). He experimented with various mercury compounds and found that they as a whole required an extremely small concentration for the prevention of micro-organism growth increase. Ethyl mercuric chloride and 6% ethyl mercuric phosphate required a concentration of only 5 p.p.m. for inhibition. Ethyl mercuric chloride 4% and ethyl mercuric hydroxide required a concentration of 10 p.p.m. for inhibition. King found the mercury compounds efficient and cheap as well as non-selective in action. The compounds are usually applied in an intermittent flow during a 24 hour period 4 days a week. At certain seasons, the dosage is increased 25 to 50% when the temperature of the water demands more control. This occurs in the spring when the water begins to warm and in the fall before it begins to chill. Appling (*Paper Trade J.* 119, no. 11:116-119, September 14, 1944) found that a concentration of 10 p.p.m. of the commercial ethyl mercuric phosphate was required against the test organism *Aerobacter aerogenes*. This commercial product sells for approximately $0.48 per pound, thus requiring $4.80 worth of chemicals per 1,000,000 pounds of water, based on Appling's computations for the inhibition concentration of 10 p.p.m.

There is on the market another mercury compound found by Appling to require a concentration of only 1 p.p.m. for effective inhibition against the test organism *Aerobacter aerogenes*. The approximate cost of this is $0.70 per ounce which would re-

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Only recently there has been developed by the writer a new organic compound,* a colorless odorless liquid that not only possesses the seven above mentioned qualifications for mold and slime control but also is extremely practical from the cost angle, comparing favorably with presently used slime controlling chemicals.

This new chemical is a complex organic compound with a small amount of an organic mercurial added. This latter quantity, however, is so small that under the proposed 1 p.p.m. concentration usage recommended, only 1 part of mercury per 50,000,000 parts of water is present. It was found that 1 p.p.m. of this chemical was more effective both on a concentration basis and cost basis than eight leading chemicals normally used for slime control. For continued optimum efficiency, a 2 p.p.m. concentration is advisable.

Because it will inhibit bacterial multiplication, it is recommended that felts in the paper mill be treated with this compound. It is noticed that wherever there is slime a so-called pitch collects on felt. This often causes a greasy spot that shows on the finished paper. On fine paper, such as writing paper, this results in a complete loss. By controlling slime formation and other bacterial multiplication on the felts —in other words, by having felts actively antiseptic—the theory is advanced that not only would the so-called grease spots on the paper be decreased, but the multiplication of slime-forming organisms that inoculate the white water system would be retarded.

Experiments are now being conducted at certain mills on the use of this new chemical for slime control. From early reports, the indications are that it has infinite possibilities in this field because of its effectiveness, prolonged action, and nonselectivity. Another paramount and important feature is its "ease of handling."

*The product is sold under several trade names, the most prominent being Perm-Aseptic, Ramplex, Fen Antimildew, Fenaseptic, etc.

Present and Possible Uses for Tall Oil

WILLIAM H. JENNINGS, Manager, Chemical Div., Chesapeake-Camp Corporation

Some of the present important uses of tall oil are in the preparation of soluble oils by sulphonation, manufacture of industrial soaps, as an additive to laundry soaps where a certain amount of rosin is desired, preparation of asphalt emulsions, and concentration of phosphate and other ores by flotation. Because of the nature of its constituents, tall oil lends itself to easy sulphonation; resulting in a product which can satisfactorily replace a considerable amount of oleic acid in the preparation of soluble oils. In fact, the addition of sulphonated tall oil to soluble oils made from oleic acid have a tendency to stabilize the mixture because the rosin acids present in the tall oil lower the interfacial tension between the oleic acid soap solution and mineral oil. In the manufacture of so-called cold water or caesin paints, sulphonated tall oil was found to be an ideal emulsifying agent.

Although tall oil itself is a low-priced commodity, when the chemical analysis is examined, it is seen that every constituent, if separated in a substantially pure form is worth from three to six times the value of the crude oil. Much work has been done on the separation of the components and several attempts have been made to accomplish this separation on a commercial scale; however, none of these attempts have been fully successful. By fractional distillation under vacuum, a fatty acid fraction containing up to 95 per cent fatty acids, and 5 per cent rosin acids and a rosin fraction consisting of approximately 95 per cent rosin and 5 per cent fatty acids are obtained. This process results in a relatively high still residue known as tall oil pitch, and it is questionable whether this process will prove to be economically sound on a low priced fat market. In the writer's opinion, it is only a matter of time before a process for separation will be developed that will prove commercially feasible. Once this separation has been accomplished, tall oil will no longer be regarded as a substitute for cheap fats, but, because of the value of the separated constituents, will be the source of raw materials for higher priced products.

The composition of tall oil varies with the species of wood from which it was obtained, the length of time the wood was stored before processing, the season of the year in which it was cut, variations in the procedures for cooking the wood chips, and methods for converting the black liquor soap skimmings into the oil. The fatty acid fractions have been found to consist of linoleic acid 50 to 80 per cent, linoleic acid 5 to 15 per cent, oleic acid 17 to 45 per cent. A program is now under way to obtain information on the variable physical and chemical properties of tall oil made from skimmings produced in different regions of the country during the various seasons of the year. The very fact that the fatty acid fraction contains a high percentage of linoleic acid suggests that it has interesting possibilities in the manufacture of synthetic drying oils. By changing the linoleic acid over to its conjugated isomer and esterifying with glycerol, a drying oil is obtained which surpasses linseed oil in its drying properties. Many new fields will be open to the separated fractions; the fatty acids being

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consumed by the manufacturers of edible oils, alkyd resins, high grade soaps, soluble oils, textile oils, cutting oils, and so forth; the rosin acids will be suitable for manufacture of rosin size for use in the paper industry, for conversion into various rosin esters, soaps, and so forth.

In addition to the rosin and fatty acids, about 3 to 4 per cent of sterols may be obtained. At present, there is no large use for this material; however, as soon as it is made available in quantity, no doubt, important uses will be found.

Relative Toxicity of Disinfectants Recommended for Use in the Paper Industry

II. Inhibiting Concentrations for Bacillus mycoides and Aspergillus niger

JOHN W. APPLING and JOHN F. McCOY

Although there are many disinfectants on the market for use in the paper industry, a standard testing technique or method for the evaluation of disinfectants recommended for use in the paper industry does not exist. The need for such a method becomes apparent when it is desired to compare results from different laboratories.

During the past forty years, a vast amount of work has been done using phenol as a standard for evaluating disinfectants. In 1931, the United States Food and Drug Administration method (United States Food and Drug Administration Methods of Testing Antiseptics and Disinfectants. U.S.D.A. Circular no. 198, Dec., 1931, 20 p.) for determining phenol coefficients became official for evaluating disinfectants in this country. Without going into details, it can be stated that the phenol coefficient is merely a numerical result which expresses the killing effect of a disinfectant compared with phenol when tested under closely prescribed conditions. Although there still is considerable disagreement among bacteriologists concerning the suitability of phenol as a standard, the method is generally used for the evaluation of disinfectants for the food and drug industries.

The vast amount of work done in developing methods for the evaluation of disinfectants in various fields indicates that a critical approach should be made to their evaluation for the paper industry.

In pulp and paper mill systems, it is often impractical and uneconomical to maintain killing concentrations of disinfectants; hence, there is greater interest in the knowledge and application of the inhibiting concentrations. It should be emphasized that bacteria can withstand inhibiting concentrations and, if the dosage is lowered for sufficient time, these same bacteria will soon attain normal growth and multiplication. There is great need of maintaining the required inhibiting concentration, which probably is purposely exceeded by an arbitrary safety margin in some mills in order to insure proper microbiological control.

The Petri plate method has been used extensively by the authors to determine the inhibiting concentrations of many disinfectants. In order to apply this method to a material of unknown toxicity, it is necessary to initiate a range-finding series of concentrations in nutrient agar. The latter varies from 0.002-0.02% in increments of 0.002%. When the inhibiting concentration is found to be greater than 0.02%, a second series varying from 0.02-0.2% in increments of 0.02% is prepared. If the inhibiting concentration is greater than 0.2%, it is reported as such. On the other hand, if the range-finding series indicates an inhibiting concentration less than 0.002%, the procedure is to prepare descending series until the value is determined. The series used and the increments for each are as follows:

(a) 0.0002-0.0020% (increment of 0.002%)
(b) 0.00002-0.0002% (increment of 0.00002%)
(c) 0.000005-0.00002% (increment of 0.000005%)

The details for preparing the agar-disinfectant mixtures, for streaking the plates with one test organism, for incubation, and for observation were given in the preceding paper (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 119, no. 11: 116-118, September 14, 1944). Some details differed from one test organism to another and these will be given in this paper.

The results which are being reported at this time are based on laboratory work at The Institute of Paper Chemistry under

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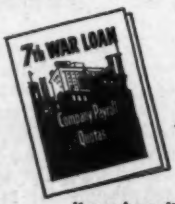

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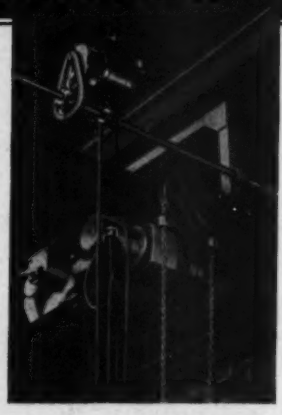

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the sponsorship of the Biological Control Committee of the American Paper and Pulp Association. The inhibiting concentrations of ten commercial disinfectants have been determined for the test organisms *Aerobacter aerogenes*, *Bacillus mycoides*, and *Aspergillus niger*. The first was selected as a representative species of nonspore-forming bacteria which are frequently found in paper-mill slimes. The culture used was originally obtained from the University of California and is now maintained in the culture collection of the Institute. The second was selected as a representative species of aerobic spore-forming bacteria which are found in paper samples. This culture, which was isolated from a paperboard sample, was found by Appling and Shema (*Paper Trade J.* 114, no. 13, 40-44, March 26, 1942) to be very heat resistant. The third and last was selected as a representative species of the fungi commonly designated as molds.

The testing technique and the resulting data for *Aerobacter aerogenes* have been given in the preceding paper. Most of the technique described was directly applicable to the work with *Bacillus mycoides* and *Aspergillus niger*. In the case of the former, four-day old cultures were used to prepare the water suspensions for streaking the plates. Most of the ten disinfectants were tested against spore suspensions—that is, the water suspension was heated 10 minutes at 80±0.5 C. to kill all vegetative cells. Some of the disinfectants were also tested against a mixture of vegetative cells and spores. There was no significant difference between these suspensions. The incubation period was 48 hours at 37 C. for *Bacillus mycoides*. As in the case of *Aerobacter aerogenes*, each run was repeated at least once and each plate consisted of two streakings.

In the case of the fungus *Aspergillus niger*, the testing technique differed from that used for the two bacterial species in several ways. Malt agar replaced Bacto nutrient agar. The inoculum was a spore suspension prepared by transferring to a bottle, containing 50 cc. of sterile water and glass beads several portions of sporangia from a 7-day old malt agar tube slant of the test organism. When shaken vigorously for several minutes, the suspension became slightly dark colored. The plates were prepared to contain known amounts of the disinfectant and malt agar. Instead of streaking the plates, a loopful (3-mm. loop) of suspension was placed at each of two diametrically opposite spots on the malt agar surface. The plates were incubated at 30 C. for one week before examining them for growth (at a magnification of 20x when in doubt). Here, again, each run was repeated at least once.

Ten chemical disinfectants have been tested against each of the three test organisms in the manner already described. The trade names of the disinfectants tested follow: Lignasan, Merfenel, Nalco 21, Nalco 21-B, Nalco 21-M, Nalco 23, Penetox, Permatox 1-S, P.M. 32 Powder, and Santobrite.

The three test organisms varied considerably in their resistance to the disinfectants tested. The most resistant one was the nonspore-former *Aerobacter aerogenes*, whereas the least resistant was the sport-former *Bacillus mycoides*. The chlorinated phenolic compounds proved to be much more toxic for the spore-former *Bacillus mycoides* than for either of the other two test organisms. This fact and the marked general toxicity of organic mercurials have been utilized very effectively by at least one manufacturer of disinfectants. Undoubtedly, as more toxicity data are obtained, better use will be made of them in compounding more generally effective disinfectants.

Cost-toxicity data show the futility of selecting a disinfectant solely upon a cost basis. However, it would be uneconomical to disregard cost and to select a disinfectant solely upon a toxicity basis. It is believed that the most effective and economical use of disinfectants can be made by the use of cost-toxicity data, although the authors recognize the possibility of a given disinfectant being more or less toxic in a mill system than in agar media such as were used.

Not long ago, the authors were confronted with a problem which illustrates the importance of a standard disinfectant. Another testing laboratory disagreed with the published results for the inhibiting concentration of Merfenel for *Aerobacter aerogenes* (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 119, no. 11:116-118, September 14, 1944). They did not confirm the inhibiting concentration of Merfenel; however, they did confirm that of their product. The divergence in results on Merfenel may have been due to one

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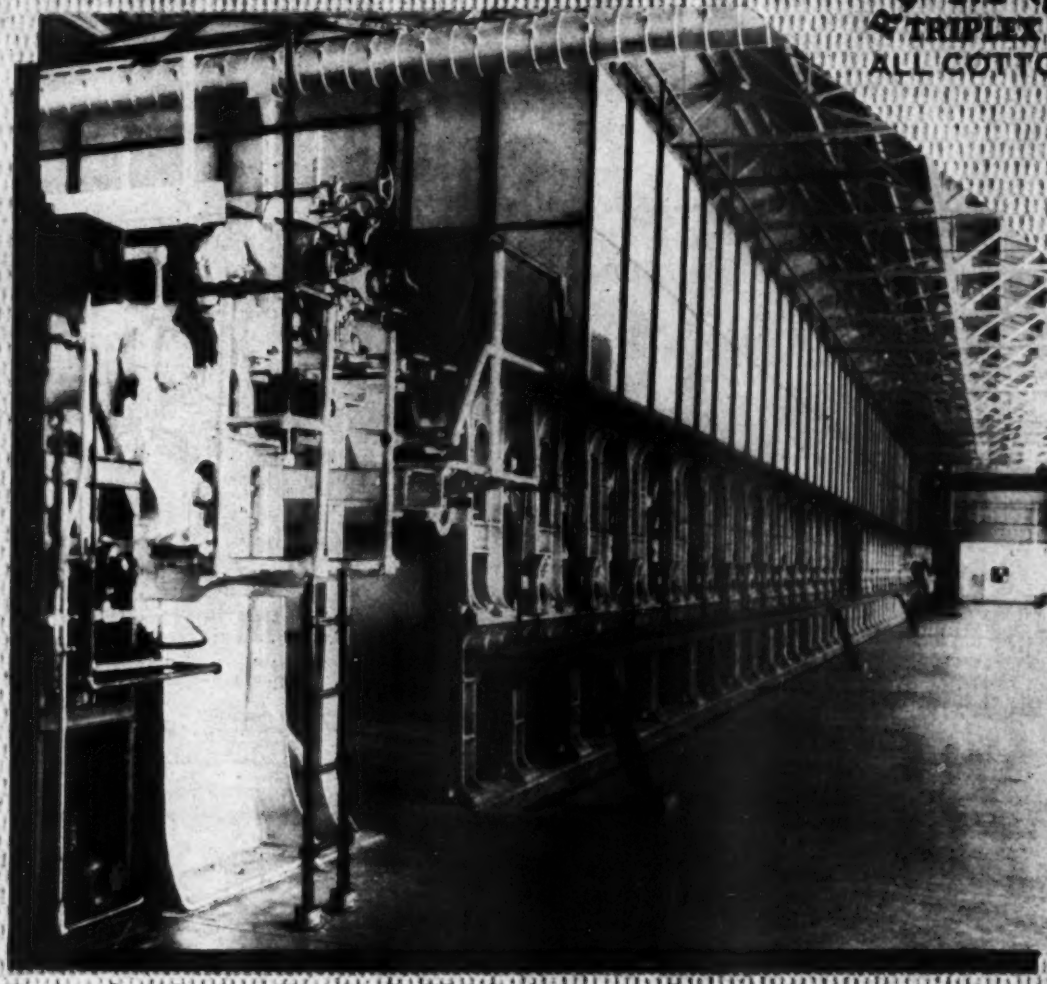

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of several reasons: (a) the test organisms differed in resistance; (b) the Merfenel samples may have differed in toxicity and solubility; (c) the two laboratories may have used different testing techniques. Of these three possibilities, (c) is eliminated because both laboratories used the same testing method; (a) is probably eliminated because, although the test organisms were not identical strains, they behaved very similarly toward the manufacturer's own product. Therefore, it would appear that the discrepancy in results must be due to a possible difference in the samples of Merfenel which were tested. The two samples are being checked by both laboratories. If a standard disinfectant had been available, the laboratories would have checked the resistance of their test organisms against this standard and, in so doing, would have discovered any difference in the test organism or in the technique used. If differences were found, their sources would be ascertained before attempting to evaluate new materials.

The Petri plate method has been thoroughly investigated by the authors, and it has been successfully applied to the determination of the inhibiting concentrations of many materials against various test organisms. The method has given reproducible results in each of two different laboratories, and this is an important characteristic for a proposed standard method. In addition, the Petri plate method lends itself readily to screening tests for selecting the most promising materials for more extensive tests.

A standard method for evaluating disinfectants should specify a means for checking the skill of the technician and the resistance of the test organism. The official phenol coefficient method of the U. S. Food and Drug Administration (United States Food and Drug Administration Methods of Testing Antiseptics and Disinfectants. U.S.D.A. Circular no. 198, Dec., 1931, 20 p.) uses a special grade of phenol as its standard. The test organism should survive specified concentrations of phenol and be killed by others within a definite time period. The authors have used Merfenel, a technical grade of phenylmercuric acetate, as a temporary standard since it had the highest degree of purity among the disinfectants tested. A standard disinfectant should be chemically pure, stable under the conditions of its use and storage, and its toxicity should be constant and easy to reproduce. Two materials suggest themselves at the present time—namely, phenol and mercuric chloride (C. P. grades).

The Committee is anxious to expand the testing program to include all commercially available disinfectants which are being recommended for use in the paper industry. It is willing to determine the inhibiting concentration of any representative sample which a mill may wish to have examined. There are only a few on hand to be tested at present; therefore, more are desired. If any manufacturer wishes to submit any new material prior to its release for mill use, he should communicate with the Committee.

Projected Formulation of Stream Pollution Problems

H. W. GEHM, Technical Adviser
National Council for Stream Improvement

By techniques developed by stream experts of the U. S. Public Health Service Experiment Station, the Institute of Public Health at Columbia University, Manhattan College, and Columbia University, it is possible to derive the following information for a watershed with reasonable accuracy:

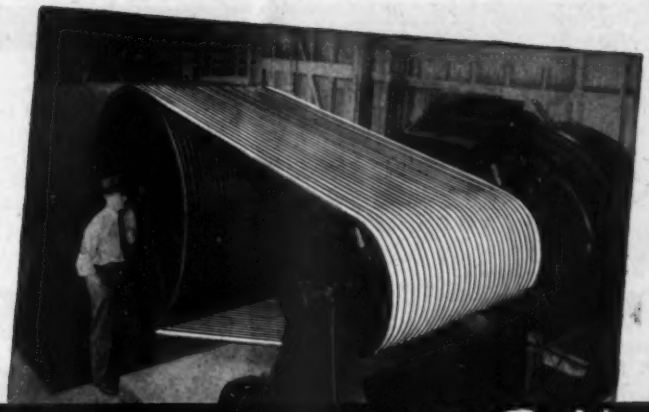
1. The degree of responsibility of municipalities and individual industries for pollution.

2. The degree of abatement necessary to restore the water to satisfactory condition for the uses to which it is to be put.

3. The degree to which the stream may be safely utilized to purify wastes.

4. The effect of water diversion and impounding upon the water quality.

The pulp, paper, and paperboard industries, being large consumers of water and beset by serious waste disposal problems have advanced further than other industries in consciousness regarding this resource. The efforts of the past have indicated a need for a combined operation on the part of this industry as it was found to embody a multiplicity of intricate problems differing from place to place and process to process. This realization culminated in the founding of the National Council for Stream Improvement,



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whose task it is to solve surface water problems by means of research and development work in the field of pollution control. Legislation and regulation have proven their inability to protect streams as this is not a problem which policing or political activity can handle. More judicial use of streams will come only through consciousness of necessity and provision of means whereby control of pollution can, practically and economically, be carried out. It is an undertaking of great magnitude and must be handled as such from an offensive, rather than a defensive, position.

In undertaking the broad program of the council, it was felt that one of the most important jobs consisted of evaluating existing pollution problems in the best possible manner. Manhattan College was selected for the work, because personnel, recognized as authorities in this field, were available there, the necessary library facilities were at hand and its proximity to the offices of the council allows close co-operation. At present a staff of three people are engaged under the direction of Professor Velz. Employing existing stream survey records, Manhattan College is proceeding with an evaluation of the problems of the pulp, paper and paperboard industries on all the watersheds, or sections thereof, where the industry is concerned to an important degree. Public agencies have expressed their willingness to co-operate in this job by directing additional survey efforts toward filling in gaps in the existing data.

The first task of the project will be one of obtaining and assembling proper detailed maps of the watersheds. Upon these maps the location of municipal and industrial water intakes and sewers must be spotted and identified, and all stream appurtenances shown. The physical character and profile of the stream must also be indicated for certain sections. To date, this work is proceeding at a rapid rate, and on completion a full set of detailed watershed maps will be available for use in the analysis procedure and for reference purposes.

Secondly, the monthly records of volume and temperature runoff of water diversions, water supplies, and waste discharges must be obtained in as complete detail as possible. Accompanying these data must be notations regarding periods and methods of measuring and any existant limitations to indicate reliability. Chemical and sanitary analyses of the streams throughout areas where the industry is involved must be obtained for each season of the year together with representative analyses of sewer effluents.

Thirdly, notation must be made for zones of the watersheds regarding the uses to which the water is put. Potable and industrial supply, cultivation of marketable fish and shellfish, recreation and bathing, navigation and other uses must be considered in this regard. The existence of nuisances resulting from pollution will also be recorded.

Additional information, of value in assembling a comprehensive picture, consists of existing and tentative regulations and standards regarding water quality and effluent discharge. Reference as to control of water flows to adjust seasonal variation will be recorded as, in some instances, this procedure is practical where considerable volumes are impounded. Facts will be obtained concerning degree and efficiency of waste treatment and prevention will also be of value as analysis of the various conditions will indicate what procedures must be followed in this regard and what the needs of the industry are in respect to effluent treatment, e. g., results may show that in a number of instances more careful control in the manufacturing process may suffice. In others, it will point out the requirement for a treatment process which would apply. This information will be of inestimable value to research groups working on treatment processes, as it will give them a yardstick for measuring the applicability of their developments and projected ideas.

On completion of the mapping, collection, and assembly project outlined above, reports will be prepared to accompany each map setting forth in abstract all the pertinent facts concerning each stream, and including the results of computations made with these data which will provide answers to the many questions involved in stream improvement. Hence an abstract and fairly complete guide for attacking the problems at hand will be obtained.

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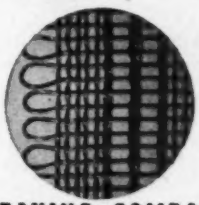

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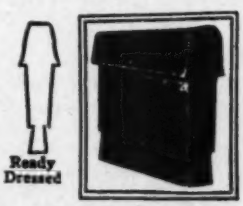

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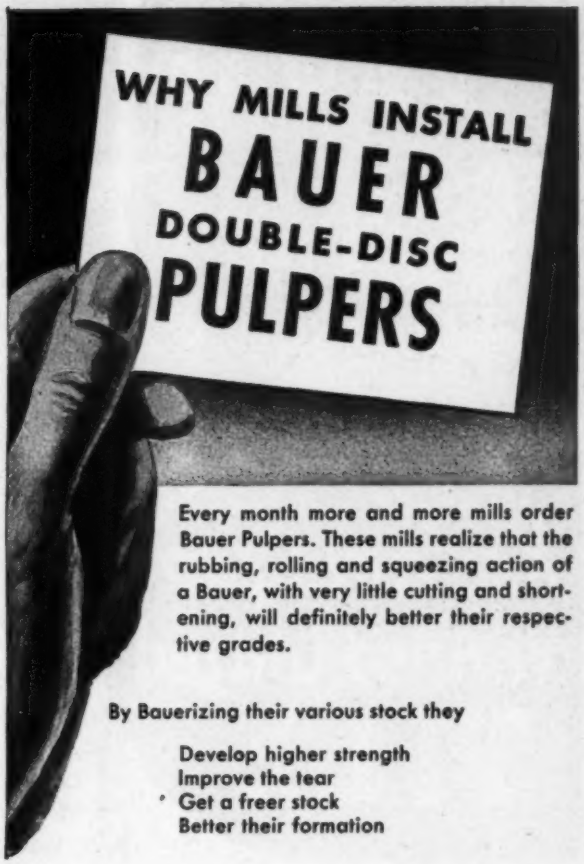

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The Problem of Ground Water Usage and Its Effect on Total Local Supply

LEWIS B. MILLER, Chemical Engineer
Consulting Div., W. H. and L. D. Betz

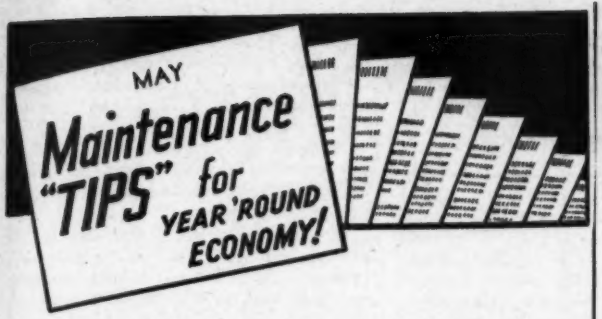
In many cases, the water supply for both sanitary and industrial uses has been drawn from ground water supplies (as distinguished from the water present in surface bodies such as streams or lakes and from water more or less strongly held by the soil). Industries already present in such areas have increased production to the limit. The result has been an unprecedented use of ground water drawn from wells in the areas in question. The great increase in air conditioning and humidification installations has placed an added strain upon ground water supplies, since such installations normally cannot use the warmer surface supplies during hot weather but must draw a supply of cool water from wells. This is a usage which will increase greatly during the post-war period.

It has been amply demonstrated that ground water supplies can be seriously reduced and this introduces the main point of the present paper. The pulp and paper industry is a very large user of water which is frequently drawn from ground water sources. It is of the greatest importance, particularly where the pulp or paper plant is located in an area where the sub-surface supply may become critical, to conserve the water supply by every reasonable means. If a pulp or paper company plans the construction of a new plant in an unfamiliar area, it is of the utmost importance that an early survey of the water supply be made in order to insure an adequate supply of suitable quality and that the mill be so designed as to insure that water usage will be kept at a minimum, compatible with proper mill operation.

The importance of ground water has been recognized and is being made the subject of study by the Federal Government. Since 1935, observations on water levels and artesian pressures have been made by the U. S. Geological Survey upon a large number of observations wells located throughout the country. For this purpose, the United States has been divided into six areas. The latest published data are for 1942. (Water levels and artesian pressures in Northeastern states. U. S. Geological Survey Water Supply Paper No. 944, 1942); (Water levels and artesian pressures in Southeastern states. U. S. Geological Survey Water Supply Paper No. 945, 1942); (Water levels and artesian pressures in North-central states. U. S. Geological Survey Water Supply Paper No. 946, 1942); (Water levels and artesian pressures in South-central states. U. S. Geological Survey Water Supply Paper No. 947, 1942); (Water levels and artesian pressures in Northwestern states. U. S. Geological Survey Water Supply Paper No. 948, 1942); (Water levels and artesian pressures in Southwestern states and Hawaii. U. S. Geological Survey Water Supply Paper No. 949, 1942). In general, where an area is not subjected to heavy pumpage, the ground water levels are found to vary with local precipitation although a number of other factors also affect the ground water supply.

In addition to the natural method of replenishing the ground water supply through precipitation, local areas have achieved ground water replenishment through engineering means. In Louisville, Kentucky, serious ground water depletion resulted from greatly increased usage of cooling water by distilleries manufacturing alcohol for the synthetic rubber industry. To replenish the ground water supply, cold water was purchased from the city during the winter season and was injected directly through wells into the underground reservoir to be stored for summer use (Guyton, W. F., *Water Works Eng.* 98, January 10, 1945, 18); (Newkirk, S. F., Jr., *Water Works and Sewerage* 92, January, 1945, 1). Fortunately, the underground reservoir at Louisville is of such a nature to permit such storage since it consists of coarse Pleistocene glacial deposits partially filling a limestone valley. The water thus stored is more or less permanently retained until again required. This illustration is sufficient to indicate the lengths to which it is necessary to go in individual cases in order to augment natural ground water supplies.

There is a serious objection to injecting water into an aquifer which may be used for potable purposes; this is the possibility



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of contaminating the aquifer if the water injected is not sterile. In general, it would not be desirable for pulp or paper mills to attempt to inject recovered process water into wells because of the probability of soon plugging the porous water bearing stratum with the suspended solids present and because of the polluting nature of such waters. In the writer's experience only one paper mill has attempted to dispose of process water in this way with the result that the porous aquifer soon became plugged.

Paper and pulp mills offer many (Miller, Lewis B., *J. Amer. Water Works Assoc.* 36, April, 1944, 420) opportunities for water conservation and all such opportunities should be embraced both as a matter of general conversation of a valuable raw material and because of their immediate economic aspects.

Sodium Chlorite in Pulp Bleaching

G. P. VINCENT, L. E. RUSSELL and VERNON WOODSIDE
Mathieson Alkali Works

At the outset of the war, research and development in pulp bleaching with sodium chlorite, which may be obtained as a flaked product containing about 130% available chlorine, was just getting into its stride.

The brightness limitation on pulp and paper set by the Government as well as the loss of technical help to the mills soon curtailed the field development of this project considerably.

The Mighty 7th War Loan, the most difficult of all American financial campaigns, opened May 14 and continues through June 30.

KEEP ON BUYING WAR BONDS

Even during the war, however, some mills have continued the use of sodium chlorite in order to secure certain necessary results which are otherwise unobtainable. Among these are the use of acid sodium chlorite for the production of high viscosity, high strength seed-flax pulp for a very high grade paper and for the production of 70-brightness bleached northern kraft pulp with a constant maximum strength; and the use of hypochlorite-activated sodium chlorite to produce a high viscosity rag pulp and a half stuff by the partial stripping of vat dyed rags. This latter process is found to be particularly useful in indanthrene dyes which sodium hypochlorite alone will not touch.

The original process for using sodium chlorite in bleaching cellulose products was acid activation. Although conditions vary somewhat for different pulps, the usual method is to treat the pulps or rags in an acid solution containing approximately 0.4% available chlorine as sodium chlorite based on the weight of the pulp. The pH is adjusted to 4, and the temperature maintained at 75 C. Chlorite reacts with acid to give chlorous acid and chlorine dioxide which bleaches the stock to a very high white without observable degradation or strength loss.

Since equipment may not be suitable for the use of acid processes and also because it may be desirable to reduce the amount of sodium chlorite and steam required by the acid activation method, other means for activating sodium chlorite were sought.

It was found that hypochlorite could be added to the chlorite bleaching solution, producing results characteristic of chlorite, rather than hypochlorite, bleaching. The process consists in treating the pulp with approximately 0.4% available chlorine as sodium chlorite on the weight of the stock treated and hypochlorite containing approximately 0.8% available chlorine. The pH is kept at 8.5 to 9 and the temperature at about 40 C. The sodium chlorite may be dissolved and added to the pulp suspension prior to the addition of the hypochlorite solution or may be mixed with the hypochlorite stock solution and thus both added simultaneously. If the latter method is used, the pH of the solution must be maintained above 11 to avoid loss of available chlorine by the reaction of the two chemicals. The bleaching is carried out according to normal hypochlorite bleaching practice.

A third method of chlorite activation, namely, with chlorine, offers certain advantages. This bleaching process is based upon the fact that chlorine gas will react with chlorite solution to produce chlorine dioxide. About 0.4% available chlorine as sodium chlorite is added to the pulp suspension and mixed thoroughly. Then 0.25% available chlorine as chlorine gas is added. This may be done conveniently by means of a chlorine inlet ring in the stock pipe. The pH of the mixture should be maintained at 6 by the addition of caustic soda.

At the same brightness, this method is less expensive than the acid activation method, and the resulting strength of the pulp is comparable.

A very practical way is thus afforded to generate chlorine dioxide in the pulp suspension. As is known, chlorine dioxide has been used in the laboratory to prepare holocellulose directly from wood chips. However, this would be uneconomical for mill use and is, in fact, unnecessary since the lignin can be substantially removed by conventional methods with a very small degree of degradation of the remaining pulp. At this point, chlorine dioxide can be used to bleach the stock to much higher brightnesses with much less strength losses than are observed when conventional methods are employed.

The practical aspects of the chlorine activation of sodium chlorite has led some very large pulp operators to consider the development of a new bleaching process based upon its use replacing hypochlorite. A tentative flow sheet indicates chlorination followed by caustic extraction. This cycle may be repeated with the final stages employing chlorine-activated sodium chlorite. Pulps of maximum strength and a high degree of purity and brightness should be produced by this process.

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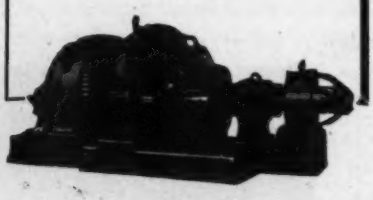

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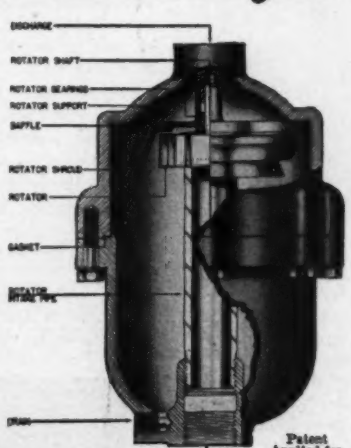
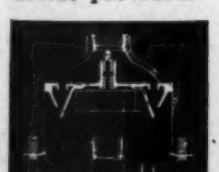


Patent Applied for



Drawing shows turbo-rotor, shroud and baffles. The design of the baffles precludes the possibility of capillary action of entrainments resulting from high velocity.

THREE MODELS AVAILABLE—A-1 will accommodate volumes from ½ to 5 cu. ft. A-2, volumes from 10 to 35 cu. ft. A-4, volumes from 35 to 100 cu. ft. Multiple units are recommended for volumes above this range. Pur-O-fier is the only standard unit that can be engineered to meet any air volume for regular or intermittent service.

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Capacities—10 to 220,000 gallons per minute.

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NEW EQUIPMENT AND SUPPLIES

Recirculating Indirect Air Heater →

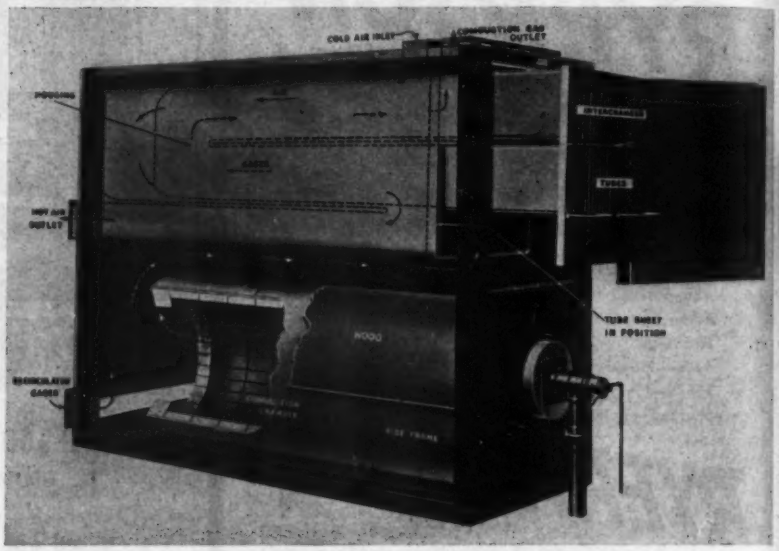
J. O. Ross Engineering Corp., 350 Madison Ave., New York 17, N. Y., has announced the new Ross Recirculating Indirect Air Heater. In this design of heater, a horizontal two pass, return bend type of interchanger is located over a refractory lined combustion chamber and both are housed within a steel casing. An insulated door is provided for access to the heating surface and to the interior of the heater for cleaning, inspection and repairs. Flat rectangular steel tubes, beaded and welded into a heavy tube sheet make up the interchanger.

In operation, the air to be heated passes along the outside of the tubes and the combustion gases pass through the tubes. The gases and air travel in counterflow direction. Maximum air delivery temperaure is 600 Fahr.

The heater is made in two sizes: namely, R-75 with an output of 750,000 Btu.'s per hour, and R-100 with an output of 1,000,000 Btu.'s per hour.

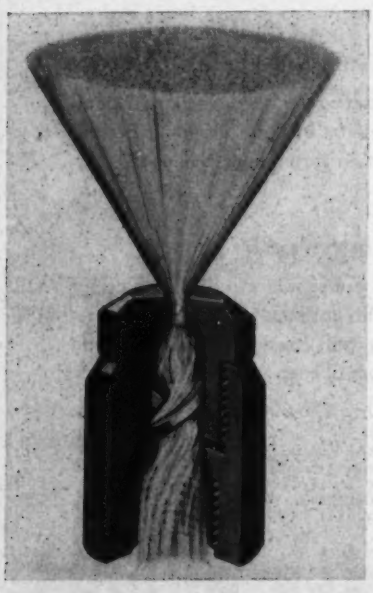
Oil or gas may be used as fuel, the burner depending upon kind of fuel used.

For capacities above the output of an individual unit, it is possible to group units in either or both sizes.



Corrosion Resistant Spray Nozzles

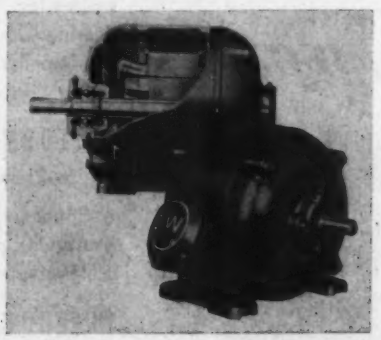
Under the designation of *Fulljet*, Spraying Systems Co., 4021-G West Lake St., Chicago 24, Ill., has announced a line of corrosion resistant spray nozzles for the



handling of acids or other corrosive liquids. For any given liquid pressure, the nozzles spray at predetermined capacities and rates of flow as well as at specific spray angles. The nozzles are available in hard rubber, lead, or plastics.

Protected Type Motor

Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., has announced a protected type motor. Rated 40 C rise, full-load continuous duty, with a 15 per cent service factor the motor has no openings in the frame or shields above the horizontal center line. Other fea-



tures of the motor include; heavy cast frame construction, coils protected by vinyl acetal insulation, interchangeable front and rear shields, and specially designed guides for directing cooling air.

Mounting dimensions of the motor conform to the standards of the National Electrical Manufacturers Association — the motor being available in sizes up to and including the 284 frame.

Auxiliary Lens for Magnifiers

An auxiliary lens, No. 05, has been announced by Stanley Electric Tools, New Britain, Conn., for use with Stanley *Fluid-Lite* Magnifiers No. 701 and No. 701H. The lens (2½ in. in diameter and set in a cup-shaped frame) fits under the lens frame of a magnifier. The use of the auxiliary lens with either magnifier (both fluorescent lamp equipped) doubles the magnifying power.

Water Demineralizer

American Cyanamid & Chemical Corporation, 30 Rockefeller Plaza, New York 20, N. Y., has announced a water treating mechanism which produces virtually mineral-free water (chemical equivalent of distilled water). This unit, designated as *Filt-R-Stil*, utilizes melamine-derived and other resins for transforming the dissolved salts in the water to the corresponding acids and in turn tbsorb the acids.

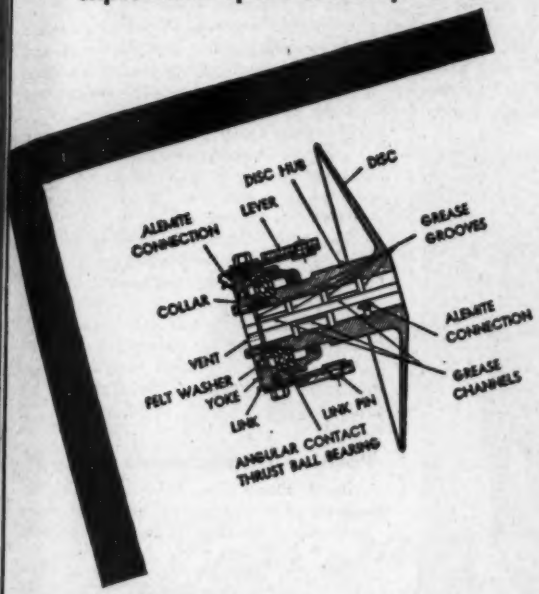
The final demineralized water has an average salts content as low as two parts per million as calcium carbonate. Water as pure as one-half part per million has been produced. The process also removes dissolved carbon dioxide from the water.

The Filt-R-Stil is made in different sizes and capacities to meet various requirements.

A small portable unit is made in two forms; one for field and the other for bench use. The capacity of either form of this unit is eight to ten gallons of demineralized water an hour.

The portable units are equipped with cartridges of ion exchange resins, which are renewable when exhausted, in much

★ A smooth operating feature you would expect from speed-control pioneers



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If knife grinding is a problem in your plant, consider these features of the Covel-Hanchett GK Knife Grinder:

Completely automatic—no skilled operator necessary. Simple design . . . for minimum maintenance. All feed works grouped in a single unit, mounted in front . . . for easy, quick inspection. All moving parts run in a constant oil bath.

Operators report savings of 40% and more in knife steel, after installing GK's. Why not write the pioneers in the field today, and see how *your* knife maintenance costs can be cut? No obligation, of course. And ask for complete details on the new GK, in Bulletin 1144-PW.

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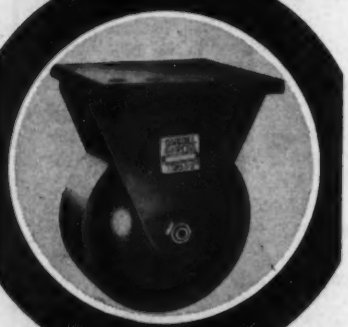

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the same way as flashlight batteries are renewed. An automatic shut-off or warning device on each unit indicates when renewal of the cartridge is necessary.

A laboratory unit has a capacity of approximately thirty gallons an hour. In place of a cartridge, this unit employs four beds of alternate cation and anion exchange resins in pyrex glass columns connected by an intricate piping system.

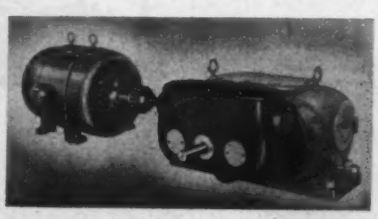
As the water passes over the first bed, dissolved salts are transformed to the corresponding acids. These acids are absorbed on the second bed. The third bed picks up any dissolved salts which have leaked through and the fourth absorbs the remaining acids as well as removes the carbon dioxide.

Special sizes of the Filt-R-Stil are also made for large industrial users.

Both the laboratory unit and the large units for permanent installation are equipped with a system for the reactivation of the ion exchange resins, which thus can be used over and over again. These units are also equipped with electronic controls, operating on resistant circuit in the water, which indicate when the effluent water is mineral-free and/or when the quality is below standard and regeneration is thus required.

Differential Variable Speed Drive

A differential variable speed drive consisting of two mechanical differentials and a standard variable speed reducer has



been announced by The Ohio Gear Co., 1364 E. 179th Street, Cleveland 10, Ohio. By means of a control box furnished with the unit, the output shaft can be made to duplicate any movement of the control shaft. The control shaft may be operated with but a few inch pounds torque while the output shaft will deliver the full power of the unit.

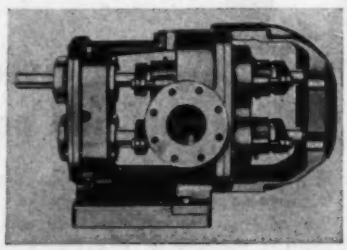
In the differentials, the bevel gears are made of alloy steel, case hardened and mounted throughout on antifriction bearings, the worms are hardened and ground and the worm gears are of bronze.

Using an 1800 rpm squirrel-cage motor as a source of power, output speed can be obtained from 0 to 800 rpm in one direction, or from 400 rpm forward through 0 to 400 rpm reverse.

The unit illustrated is designated as No. T3. It is made by utilizing Link Belt PIV No. 3 and two mechanical differentials. Torque capacity of the unit is 750 inch pounds throughout the entire range. Other units may be supplied to provide up to 2100 inch pounds torque through the same speed ranges. Smaller units are also available.

Positive Displacement Pump

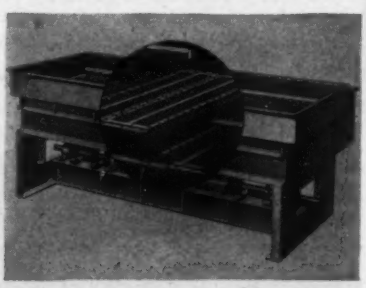
Bump Pump Co., LaCrosse, Wis., has announced a heavy-duty industrial pump for position handling of liquids. Equipped



with ball bearing in both face plate and rear gear case, this pump can be furnished with either flanged or threaded intake and discharge ports. The pump can be made of iron, bronze, nickel alloy, stainless steel, or other metals; and can be furnished in direct, V-belt, or pulley drive. It has operating speeds that range upward to 400 r.p.m., and a capacity of 100 gallons per 100 revolutions.

Device for Fastening Screen Plates

D. J. Murray Manufacturing Co., Wausau, Wis., has announced the *Murco*



Screen Plate Hold Down Device (patent applied for). According to the manufacturer, this device eliminates eddies in the pulp stream, speeds up the cleaning and repairing of screen plates, and aids in the production of clean pulp.

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With GARLOCK Packings, Gaskets and KLOZURE Oil Seals installed throughout the plant, the boss can relax. Frequent shut-downs for repacking, etc., are avoided . . . production zooms along without interruption . . . orders are filled . . . and everybody's happy. Standardize on GARLOCK for dependable performance and long service.

The Garlock Packing Company, Palmyra, New York
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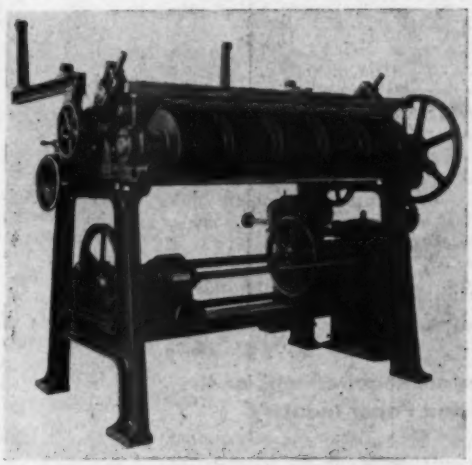

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Industrial Applications of Plastic Bearings

This is a discussion dealing with the more important properties of cotton-reinforced phenolic resin plastics and their possible use in various types of bearings. One of the first applications was in the paper industry in which bearings of this type have been used in beaters, jordans, and press and calender rolls. In this industry the use of water lubricated bearings appears to have obvious advantages, among which is the absence of lubricating oils and the avoidance of pulp or paper contamination with oil. Other industrial uses are discussed. Ten references. Edward H. G. Sargent Ind. Chem. 20, No. 238, 577-84 (1944); through B. I. P. C. *15*, 208 (1945).

Carbon Dioxide in Sulphite Relief Gases

The authors have sampled and analyzed gases generated at various stages of the sulphite cook. Carbon dioxide is present in the freshly prepared sulphite cooking liquor, but is not present in seasoned wood (although it is found to some extent in green wood). The greatest amounts of carbon dioxide are given off at the very beginning of the digestion and again towards the close of the cook. The initial CO_2 may be traced to the liquor; that generated later finds its origin (probably) in the hemicelluloses of the wood. The final relief gases are quite low in CO_2. There is however some of the gas generated at all stages of the digestion. O. Wurz and O. Swoboda. Papier-Fabr. Wochbl. Papierfabr. (1944) No. 2, 48-51. (Reprinted by the Alien Property Custodian.)

Chemical Requirements of the Pulp and Paper Industry

A brief but excellent review of the part played by chemicals in the industry. The article deals with consumption of sulphur, lime, caustic soda, soda ash, salt cake, chlorine, fillers, sizing and coating materials, colors and other chemicals. Statistics are given for 1936-43. R. W. Porter. Chem. Metallurgical Eng. 52, 114-16 (1945).

A Study of the Degradation Products of the Sulphite Cook

By withdrawing liquors at hourly intervals in a sulphite digestion (indirect cook for rayon pulp) the author followed the changes in the composition of the liquor. The original liquor contained 5.44% sulphur dioxide and 0.84% lime, and the digestion required 6 hours to reach 105 deg. C. (which was maintained for 2 hours) and then 8¾ hours to gradually reach the highest and final temperature, 140 degrees.

The following changes were noted: Sulphur dioxide, lime, total reducing sugars (both before and after acid hydrolysis), the total fermentable sugars (before and after hydrolysis), mannose, galactose (both by chemical assay and by fermentation), glucose (by difference), and pentosans. Between the 11th hour and the final period, the stock was also analyzed at intervals for J-N. number, per cent lignin, per cent wood gum and viscosity. The highest fermentable sugar content of the liquor (2.3%) was reached after 13 hours. The maximum mannose content (1.6%) was reached at this same point, and both remained substantially the same until the end of the cook. After 11 hours the galactose content of the liquor reached the maximum of about 0.4% and then dropped. At about this same point the pentosans were at a maximum (1.1%) and then fell slowly. Glucose values are less certain, but the high point came at about 13 hours and was about 0.6%.

Spruce wood samples were also analyzed and showed average mannan figures of 11% and pentosan values of 8.3%. In the one sample examined, springwood contained more lignin and less mannan than did summerwood, and compression wood was very high in lignin (37%) and relatively lower in mannans (7.8%).

In another cook, the stock was examined hourly between the 11th and the 20th hour of the run. At the end of the cook the pulp still retained considerable mannan (4%) and appreciable pentosans (2.9%). Besides the simple sugars, there was ample evidence that the waste liquors still retained polysaccharides of appreciable molecular dimensions. These were removed after 8-9 hours from the liquor by the following techniques: Lime salts were removed as far as possible as the sulphate or chloride. The latter is soluble in dilute alcohol. The crude polysaccharides were precipitated with alcohol, redissolved in the minimum amount of water, and then freed from lignin derivatives by precipitation with trypaflavin. The filtrate from this was treated with ammonium oxalate and ammonia to precipitate the lignin reagent and also the residual lime salts. The aqueous filtrate was then precipitated with alcohol and repeatedly purified by solution and reprecipitation with alcohol. Finally the polysaccharides were obtained in the form of an amorphous powder which showed by analysis that it was free from lignin, and one-third of which was made up of mannose residues. The remainder was probably glucose, for there was little pentosan present.

The lignosulphonates from the waste liquor were precipitated as the trypaflavin complex and analyzed. It was sugar-free and for every sulphur atom, it contained three nitrogen atoms indicating that one sulphonic acid group had combined with one trypaflavin molecule. When this complex was calculated to lignin (free from sulphonate), the carbon and hydrogen values were very close to those found by Freufenberg for cuproxam lignin. The author gives 42 references. T. Höpner. Cellulosechem. 22, No. 1, 33-48 (1944) [authorized reprint through the Alien Property Custodian].

Organic Reagents for Detecting Lignosulphonic Acid

Some organic substances serve to detect very small amounts of the lignosulphonic acids from sulphite wastes. The most sensitive of these is termed "surfen" (the salt of an aminoquinolyl derivative), which is not a dye, but which gives voluminous creamed colored precipitates with very small amounts of the acid. Examined in the light of a special lamp, the limit of sensitivity for this test is about 1.9 gammas of lignosulphonic acid per 0.45 milliliter. There are other somewhat less sensitive reagents, which are basic dyestuffs. They include: Astraphloxin FF which gives a red precipitate, Astraviolet which gives a purple precipitate, Trypotavin which gives a yellow precipitate and a number of other commercial dyes that give red precipitates. The author suggests that because of its extreme sensitivity, surfen might perhaps be used in the quantitative determination of lignosulphonic acid. August Noll. Papier-Fabr. Wochbl. Papierfabr. (1944) No. 2, 39-42. (Reprinted by the Alien Property Custodian.)

Nitro Compounds Reduced By Sulphite Waste Liquor

An interesting new use of sulphite waste liquor is suggested in connection with certain organic chemical reactions. For example, when nitrobenzene is treated with sulphite waste liquor, one of the reduction products is para-azobenzenesulphonic acid (I). Its formation is actually due to the reducing action of the lignin component of the waste liquor and the sulphonation of the reduction product by inorganic sulphites. However alkali sulphites alone do not reduce nitrobenzene, and glucose added to the sulphites causes the formation not of (I) but of azoxybenzene. When (I) was treated with tin and HCl, the products were aniline, benzidine, and para-aminobenzenesulphonic acid.

Waste liquors from spruce sulphite, caused the reduction in alkaline solution of the following aromatic nitro compounds: 2- and 4-nitrophenols, 2- and 4-nitrotoluenes, 2-nitrochlorobenzene, 2-isopropyl-nitrobenzene, and 2-nitrobiphenyl. The author gives detailed directions for carrying out these reductions and lists the properties of some new (and some known) organic compounds resulting from the reactions. Vanillin yields are also given. Irwin A. Pearl. J. Org. Chem. 9, 424-34 (1944).

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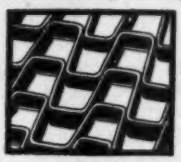

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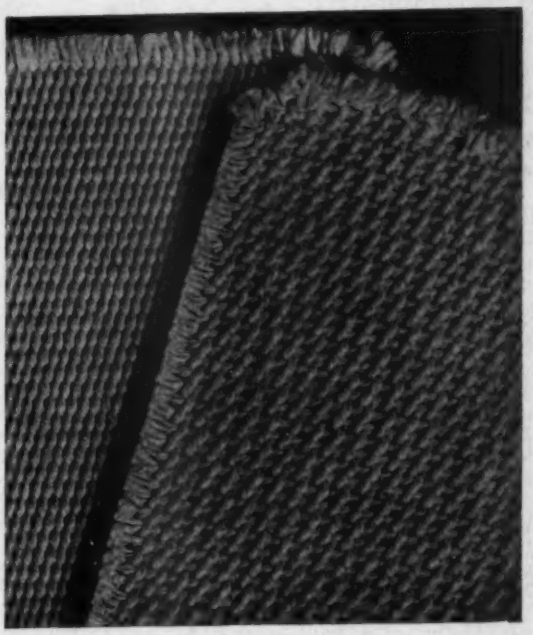

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PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Control System for Paper Machines

Patent No. 2,338,503. William H. Formhals, Forest Hills, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania. Application January 2, 1943, Serial No. 471,143. 10 Claims. (Cl. 92—72).

1. In paper making apparatus, a set of drier rolls to which a strip of paper is fed at a predetermined rate, a set of calender rolls to which said paper is fed from said drier rolls, a dynamo mechanically connected to said drier rolls, a pair of fields for said dynamo, generator means for energizing one of said fields to an extent that the total field on said dynamo will impart motor characteristics thereto, a direct current motor for driving said calender rolls adapted to take up part of the load on said drier rolls by tensioning the paper between said roll sets, and means responsive to loading of said calender drive motor for changing the output of said generator means to thereby increase the field of said dynamo.

Opaque Sheet Material

Patent No. 2,348,672. William R. Collings and Tiovo A. Kauppi, Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich., a corporation of Michigan. No Drawing. Application June 12, 1940, Serial No. 340,148. 7 Claims. (Cl. 106—193).

1. Opaque sheet material, printable with both drying oil inks and solvent-type inks, containing as the predominant ingredients ethyl cellulose of from 44.5 to 46.5 per cent ethoxy content, and for each 65 to 85 parts by weight thereof, from 10 to 30 parts by weight of an opacity producing pigment and from 1 to 10 parts of an ethyl cellulose plasticizer of hardness index greater than 100.

Paper with Improved Surface

Patent No. 2,349,704. John W. Clark, Westbrook, Maine, assignor to S. D. Warren Company, Boston, Mass., a corporation of Massachusetts. Application July 12, 1939, Serial No. 284,088. 12 Claims. (Cl. 92—68).

9. Paper product having compactness, density and printability characteristics at least equal to those of supercalendered paper, a surface of which paper product has been abrasively buffed, in the direction of the grain of the paper, by means of a polishing composition consisting essentially of powdered abrasive and a deformable carrier therefor, to produce a buffed surface characterized by a gloss, as measured on the Bausch & Lomb glossmeter, at least 10 points higher than the same paper would have if normally supercalendered and by being substantially less penetrable by varnish than the same paper would be if normally supercalendered, said buffed surface being further characterized by the absence of any scratches extending across the grain of the paper and by the presence of occasional minute difficultly discernible scratches extending only in a direction parallel to the grain of the paper.

Process of Preparing Protein Compositions

Patent No. 2,350,953. Walter M. Bain and Arthur W. Neubauer, Oak Park, Ill., assignors to The Glidden Company, Cleveland, Ohio, a corporation of Ohio. No Drawing. Application June 8, 1942, Serial No. 446,308. 15 Claims. (Cl. 106-146).

15. In the process of preparing a composition suitable for use for coating paper, the steps comprising dissolving a commercially pure alkali soluble protein in an aqueous alkaline medium at a relatively low pH value but sufficiently high to effect substantially complete dispersion of the protein, separately dissolving a proteinaceous vegetable seed flour in an aqueous alkaline medium at a relatively high pH value sufficient to effect substantially complete dispersion of the seed flour and above that necessary for the dispersion of the pure protein, preparing a mixture of the thus prepared solution in such quantities that the pH of the mixture is lower than that required for the separate substantially complete dispersion of the flour but not below a value of about 8.5.

Manufacture of Paper for Photographic Purposes

Patent No. 2,346,008. Halford Rogers Clark, Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey. Application July 27, 1940, Serial No. 348,014. 15 Claims. (Cl. 95—8).

1. A photographic paper comprising paper having thereon a coating of barium sulfate mixed with a water-susceptible lower fatty acid ester of cellulose having an acyl content of 19-30 per cent and an overcoating thereover of a photographic silver halide emulsion.

Method of Sizing Paper with Starch

Patent No. 2,337,459. Earle R. Edson, Gloucester, and Charles Quincy Ives, Reading, Mass., assignors to Le Page's Inc., Gloucester, Mass., a corporation of Massachusetts. No Drawing. Application October 10, 1940, Serial No. 360,594. 9 Claims. (Cl. 92—21).

9. In a method of making starch-sized paper requiring papermaking stock to be beaten in water in a beater engine preparatory to papermaking, those steps which comprise adding such stock to said engine together with sufficient water to enable circulation of such stock; also adding to said engine a substantially dry, pulverulent paper-sizing composition inclusive of an acidic, calcined starch component while said composition is enclosed as a relatively small unit weight within a paper bag, and beating said stock, composition and bag to substantially physically homogeneous papermaking consistency while maintaining said composition constantly under water.

Bearing for Paper Drier Cylinders

Patent No. 2,345,508. John W. Smith, Carthage, N. Y. Application July 30, 1942, Serial No. 452,966. 1 Claim. (Cl. 308—240).

In a bearing for paper drier cylinders, a series of independent rings made of a composition of carbon and graphite, a supporting shell for said rings, an annular centrally disposed ridge on said shell to prevent said rings from moving longitudinally, pins having flat surfaces attached to said bearing for preventing rotation of said rings and certain of said rings extended beyond said bearing to form thrust bearings.

Tub Size for Paper

Patent No. 2,348,685. Rolland D. Smith, Niles, Mich., and Herbert F. Gardner, Chicago, Ill., assignors to Stein, Hall Manufacturing Company, Chicago, Ill., a corporation of Delaware. Application May 29, 1940, Serial No. 337,759. 7 Claims. (Cl. 127—33).

1. The method of producing a tub size from a corn starch containing substantial amounts of apha amylose which comprises heating said starch in an aqueous medium with sodium perborate and borax to a temperature of about 200° F. and maintaining said temperature until no further substantial change in viscosity occurs, the amount of borax corresponding to about 1 per cent to about 3 per cent based on the weight of the starch and the amount of sodium perborate corresponding to about 0.25 per cent to about 2 per cent based upon the weight of the starch.

Papermaking Machine

Patent No. 2,345,647. George S. Witham, Hudson Falls, N. Y. Application October 2, 1940, Serial No. 359,372. 4 Claims. (Cl. 92—44).

1. The combination of the flow box, adjacent breast roll, the Fourdrinier wire, and the table rolls of a paper machine with pressure-applying means comprising, a casing below and co-operating with said wire to form a lower chamber enclosing said table rolls, said casing including a rear wall which is relatively flexible and normally disposed closely adjacent said breast roll, means for admitting air under pressure into said chamber, a sealing plate above and co-operating with said wire to form an upper chamber, said sealing plate being pivoted relative to said flow box so as to be movable relative to the wire and being provided with a forward lip part, means for adjusting said lip part relative to the wire, and means for admitting air under pressure to said upper chamber.

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Allis-Chalmers Mfg. Company, Milwaukee 1, Wis.—An eight-page illustrated bulletin just issued by this company contains detailed information on the first standard mercury arc converters designed for induction heating operations in the 500-2000 cycle frequency range. Drawing and wiring diagrams of a typical mercury arc converter installation explain how Allis-Chalmers supplies all essential apparatus for complete induction heating installations. Graphs and "exploded" views of the converter are used to compare it with other types of equipment used for induction heating. Differences between the old way and the new way of heating and melting metals are shown in quick-reading, illustrated form. Requests for this bulletin, No. B6373, should be addressed to the above company. Also available on request is Bulletin B6372, which explains the application of vacuum tube electronic heaters for both induction heating of metals and dielectric heating of non-metallic materials. This four-page booklet explains the two types of heating work and the advantages of each. Also included are illustrations of typical production setups of the standard 20 kw. heater.

Automatic Transportation Company, 101 W. 87th Street, Chicago, 20, Ill.—Available without charge upon request addressed as above, is the new six-page folder just published by this company, describing its "Transporter" battery powered life truck. Detailed specifications and photos cover both the pallet and platform types of trucks.

Biggs Boiler Works Company, Akron 5, Ohio—Bulletin No. 45, obtainable from this company on request, contains photos of the standard and special equipment produced by this company. Of particular interest to paper manufacturers are pictures of actual installations of digesters of various types and rotary boilers. A typical picture shows rotary boilers used for cooking straw, grass, bagasse, wood and similar fibrous materials.

Bureau of Economic and Business Research, 205 Commerce Bldg., Urbana, Ill.—Those who are considering a venture into business, and particularly G.I.'s desiring bank loans for business ventures, will do well to secure from the Bureau a copy of the 44-page booklet entitled, "Should I Start My Own Business?" which has just been issued. Prepared primarily for the person going into business for himself, it should also be helpful to anyone in business. It carries chapters on "Why Start a Business?" "Qualifications for Operating a Business Successfully," "Finding and Evaluating Opportunities," etc. No charge is made for this booklet.

Cleveland Crane & Engineering Company, 1165 E. 283rd Street, Wickliffe, Ohio—In Vol. 3, No. 2, of their bulletin, the Cleveland Crane Graphic, is shown a typical installation of the Cleveland tramrail at Canadair, Ltd. In addition to the photos and reading matter are charts with data on the cranes illustrated. Installations in other factories are also shown.

Harbison-Walker Refractories Company, Farmers Bank Building, Pittsburgh 22, Pa.—Just off the press is a new circular, "Five Insulating Brick of Prime Importance to Refractories Users," containing specific data and descriptive information which this company believes merits a place in permanent reference files. In addition to a description of the five kinds of brick, the booklet includes photos of typical installations and tables of thermal data.

Link-Belt Company, 300 West Pershing Road, Chicago 9, Ill.—In its new folder, No. 2068, a copy of which will be sent on request, this company describes the two types of its new Side-Kar Karrier for bulk materials. Photos and drawings explain the functions of the two types.

Quigley Company, Inc., 527 Fifth Avenue, New York 17, N. Y.—A new bulletin, No. A.P.122, now available from this company, describes its acid-proof cements, and will be of special interest to those in need of a quick-setting type of cement. These cements will find many uses in acidproof construction in paper and pulp mills.

Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.—The latest addition to the series of broadcasts issued by this company describes the Kamyr Pressure Filters. It also contains photos of auxiliary pulp mill equipment, such as centrifugal pumps for circulating and thick stock; quick opening gate valves and packer roller shoe screen. A second circular now available describes the standard wet machine for pulp lap forming. Both bulletins are obtainable on request.

Scientific Electric Division, "S" Corrugated Quenched Gap Company, 107-119 Monroe Street, Garfield, N. J.—A 16-page booklet, "The ABC of Electronic Heating," has been released by this company. Written for both the engineer and the manufacturer, it discusses all the essential facts in simple language. The development and history of electronic heating is covered. Among the manifestations and applications of electronic heating which are listed is that of drying paper. Diagrams illustrating typical uses of these heaters, and also photos showing types of high frequency generators are included.

Taber Instrument Corporation, North Tonawanda, N. Y.—Now ready for distribution by this company is the new Taber Abraser Testing Handbook, which explains in graphic form the function of the Taber Abraser Test. The complete testing outfit is described and illustrated.

The Timken Roller Bearing Company, Canton 6, Ohio—Now available without cost by writing to the above company on a firm's letterhead, is a new circular slide rule or Hardenability Calculator, to be used in computing the approximate hardenability of steel from its chemical composition and grain size in accordance with standard formulae. It was designed by the metallurgical engineers of the company's Steel and Tube Division.

Books

Catalog Design—This small volume of 71 pages is the work of K. Lönberg-Holm and Ladislav Sutnar, both of Sweet's Catalog Service. The book opens with a section on design standards; then it treats of design elements; and closes with a section on design patterns. Consideration is given to the function, content, and format of a catalogue in the section on design standards; to the visual unit, cover, and index of a catalogue in the section on design elements; and to nine case studies, varying from the simple to the complex product catalogue, in the section covering design patterns. Spiral-bound in a stiff paper cover, the book is priced at $3.00 a copy. The publisher is Sweet's Catalog Service, division of F. W. Dodge Corporation, 119 West 40th Street, New York 18, N. Y.

Commercial Waxes (Natural and Synthetic)—A symposium and compilation, this book, edited by H. Bennett, Editor-in-Chief, The Chemical Formulary, and Technical Director, Glyco Products Co., Inc., has been prepared for the chemist, engineer, superintendent, purchasing agent, and student. Broadly, the text is dividend into seven chapters: namely, Natural Waxes, Manufactured and Synthetic Waxes, Physical Properties of Waxes and Wax Compositions, Wax Technology, Waxes in Industry, Tables and Glossary, and Wax Formulary. In the chapter on Waxes in Industry, reference is made to paper finishes, waterproofing of kraft papers, waxed paper, hot-melt coatings, tropical waxed paper. There also are a number of formulae covering the use of wax with paper in the chapter entitled Wax Formulary. The book, of approximately 600 pages, is published by Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, New York, and is priced at $11.00 a copy.

The Industrial Housekeeping Manual (Methods, Schedules and Organization)—Addressed to building managers, supervisors and cleaning crew foremen, this manual, written by R. F. Vincent, provides a guide in establishing an adequate housekeeping and sanitary work program. The subjects treated in it follow: The Job of Housekeeping; The Importance of Work Methods; Safety Pays; Floor Surfaces; Cleaning Sanitary Fixtures and Lockers; Common Sense About Soaps; Selection, Use and Care of Cleaning Equipment; Functions and Duties of Foremen and Crew Members; Working Schedules; Vermin Extermination; Record Keeping; and True Cleanliness. Published by National Foremen's Institute, Inc., Deep River, Conn., the book is priced at $2.50 a copy.

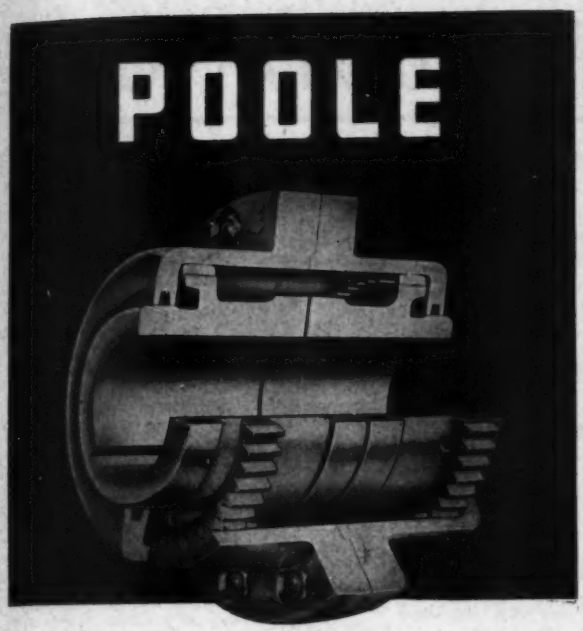
The Manufacture of Fibre Cans—Adapted from article by R. P. Bigger which appeared in the September, 1944 issue of *Fibre Containers*, this booklet of 16 pages treats of raw materials used in fibre can manufacture, types of fibre cans, design and testing of fibre cans, and fibre cans—war and postwar.

The price of the booklet is $1.00 a copy; the publisher, Board Products Publishing Co., 228 N. La Salle St., Chicago 1, Ill.

Molding Technic for Bakelite and Vinylite Plastics—This manual, the fourth edition, as indicated by the title, treats of the art molding plastic products. The text discusses important phases of molding processes and molding equipment employed generally in the commercial production of molded plastic parts. Designed as a handbook, each chapter is thumb indexed for speedy reference. Among the subject headings as revealed by the index tabs are: Principles of Molding; Molding Materials; Designing Molded Plastic Parts; Weighing, Measuring and Preforming; Molds and Mold Design; Molding Equipment; Finished Molded Parts; Molding Plant Layout; and Nomenclature.

Published by Bakelite Corporation, 30 East 42nd Street, New York 17, New York, the book is $1.50 a copy.

A Pictorial History of Paper—Written by Stephen Goerl and illustrated by Robert Greco, this volume, printed in a limited edition, has been published by Bulkley, Dunton Pulp Co., Inc., 295 Madison Ave., New York 17, New York. The subject of each illustration, and there are 22 of them, was selected to represent some significant phase in the development of papermaking. Complimentary to the illustrations in the text material, purposely kept brief. The book is attractively printed and bound. (A larger edition is contemplated when paper conditions permit.)



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IS "TOPS" FOR CONSISTENCY CONTROL BECAUSE:

1. It is so simple—turn a thumbscrew to change the consistency—no other adjustments.
2. It is so rugged and dependable.
3. The 100% all bronze and stainless construction means no rust—no dirt—no inaccuracy due to corrosion.
4. It needs lubrication only twice a year and then only at two points.
5. There are no complicated levers, joints or bearings which must be kept clean, lubricated and free of spattering stock to produce accurate results.
6. The dilution water is thoroughly mixed with the stock by the agitator.
7. Changing the rate of flow through the DeZurik Regulator does not change the outgoing consistency. Go from a heavy to a light sheet without consistency change.
8. The exclusive predilution valve unit permits taking the stock direct from high density washers and thickeners at consistencies above 15%.
9. Strings, undefibered stock, etc., cannot be hung up and will not upset the regulator.
10. The same accurate results are obtained after many years of use—and this with far less attention than was ever considered possible.

Write to the largest builder of "whole volume regulators" for more information

DeZURIK SHOWER COMPANY

SARTELL, MINNESOTA

11 W. 42d Street, New York 18, N. Y. — 5044 Marine Drive, Chicago 40, Ill. — 2141 N.W. Davis St., Portland 10, Ore.

P. O. Box 238, Lufkin, Texas — Paper Mill Equip., Ltd., Montreal, Quebec

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

	per cwt.
Blue Overalls	-5.50
Corduroy, Men's	-3.50
Corduroy, Ladies'	-3.00
Washables, No. 1	-3.00
Percales	-4.75
New Soft Blacks	-3.75
Light Prints, No. 1	-4.50
Khaki Cuttings—	
Bleachable	-4.25
Unbleachable	-3.50
New White Canvas	-6.50
New Mixed Blacks	-3.25
Canton Flannels, Bleached	-7.00
Shirt Cuttings—	
New White No. 1	-7.25
No. 1 White Headings	-7.25
White Shrunk	-5.00
Silesias No. 1	-5.75
New Unbleached	-7.50
Fancy	-3.50
Linen Cuttings—	
American	-5.00
White	-14.00
Grey	-14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowance of $1 to $2 a ton depending on the value of the grade involved.

	per ton
Roofing—	
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	38.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f. o. b. and ex dock New York City

	per cwt.
Gunny No. 1	
Foreign	Nominal
Domestic	3.00 to 3.25
Wool Tares—	
Light	3.25 to 3.50
Heavy	3.50 to 3.75
No. 1 Scrap Bagging	2.75 to 3.00
Manila Rope—	
No. 1 large	-*115.00
No. 1 small	-*105.00
Sisal Rope—	
No. 1 large	-*95.00
No. 1 small	-*85.00
New Burlap Cuttings	5.50 to 6.00
Jute Threads—	
Foreign (Nom.)	6.00 to 6.50
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	-*80.00
No. 2 sisal	-*60.00
Soft jute	5.00 to 5.50
Mixed	1.75 to 2.00

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment for machine compressed bales weighing not less than 500 pounds (with differential of $5 per ton less on certain grades for loose or bundled stock), and brokers' allowance of 4 to 9 per cent.

	per ton
Shavings—	
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, No. 1	57.50-
Soft White, No. 1	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Flat Stock—	
No. 1 Heavy Books and Magazines	38.50-
Mixed Books	22.00-
Ledger Stock—	
No. 1 White	46.00-
No. 1 Mixed (Colored)	40.00-
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	30.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Ground Wood Manila Tab Cards	37.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	22.00-
No. 1 Baled	20.00-
Old Corrugated Containers	28.00-
New Corrugated Cuts	18.00-
Mill Wrappers	22.00-
Box Board Chips	14.50-
No. 1 Mixed Paper	19.00-

CHEMICALS

f. o b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to —
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	24.00 to 24.75
80-100 mesh (bags), lb.	—
Argentine, lb.	18.00 to 19.00
China Clay—	
Domestic Filler Bulk (mine) ton	8.00 to 15.00
Domestic Coating Bulk (mine) ton	11.00 to 22.00
Imported (ship side) Bulk (lump) ton	14.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glye. (C.P.) drums, lb.	15.25 to 15.75
Litharge, powd., bbl., lb.	.09 to —
Rosin (Gum)—	
New York, per 100 lbs.	
E	6.75—
F	6.85—
G	7.00—
WW	8.00—
Rosin (Wood), carlots	4.50-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	30.00 to —
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30-
Ground and flake, drums, cwt.	2.70 to 2.95
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 55 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.75-
Pearl, barrels, cwt.	3.85-
Paper (Bp.) bags, cwt.	3.85-
barrels, cwt.	3.95-
Sulphur (Crude)— (Mine) bulk, long ton	16.00 to—
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	5.80 to 5.85

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo. (West of the Continental Divide and in Denver, Colo., ceilings are $6 per ton lower):

Bleached softwood sulphite	86.00
Unbleached softwood sulphite	74.00
Bleached hardwood sulphite	83.50
Unbleached hardwood sulphite	71.50
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda	76.00
Unbleached soda	72.00
Ground wood pulp	50.00
Ground wood—paper machine dried and mutilated	53.00
Sulphite screenings	43.50
Sulphate screenings	38.00
Ground wood screenings	32.00
Northern unbleached sulphate sideruns	73.00
Southern unbleached sulphate sideruns	63.50
Standard news print sideruns	50.00

PAPER

f. o. b. New York City

	per ton
Boards—	
Binders	84.00-
Chip	50.00-
Chip, tube and can	52.00-
Chip, full-blending	54.50-
Chip, sgl. mla. lined	62.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	63.00-
News	50.00-

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	8.25
B Grade E. F.	7.80
C Grade E. F.	7.55
D Grade E. F.	7.30
E Grade E. F.	7.05
No. 2 Uncoated Offset 4 sides. White Coated White (Trimmed 4 sides)	8.45
No. 1 Glossy	11.90
No. 2 Glossy	10.85
No. 3 Glossy	10.15
No. 4 Glossy	9.80
No. 5 Glossy	9.30
C2S Offset	10.40
C1S Litho (Varnish)	10.05
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt. 20 lb.	16 lb.
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.25
25% Rag	14.00	15.00

Rag Content Ledger—	per cwt. Zone 1
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	12.75	13.70
No. 1 (M. F.) watermarked	9.00	9.70
No. 2 (M. F.) watermarked	8.25	8.85
Plain (M. F.) unwatermarked	7.60	8.20

Sulphite Ledger—	per cwt. Zone 1
No. 1 (M. F.) watermarked	10.00
No. 2 (M. F.) watermarked	9.25
Plain (M. F.) unwatermarked	8.60

Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

News—OPA Ceilings—	per ton
Rolls, Standard (Contract)	61.00
Rolls, Lightweight (Cont.)	65.00
Rolls (Spot)	(Nominal)
Sheets	60.00

Tissues (Carlots)—	per ream
White, No. 1	1.12½ to 1.20
White No. 2	.90 to 1.00
Bleached Anti-Tarnish	1.15 to 1.20
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12¾ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (12¾ lb. to M shts.) per cs.	.80-
Toilet, Bleached (M shts.) per cs.	5.65-
Toilet, Unbleached (M shts.) per cs.	4.25-

Towels—	per case
Bleached	3.20 to 3.75
Unbleached	2.60 to 3.05

Wrappings (Kraft)—	per cwt.
Super-Standard	5.25 to 7.05
No. 1 Wrapping	5.00 to 7.40
Standard Wrapping	4.75 to 7.15
Standard Bag	4.37½

Wrappings (Sulphite and Bleached Kraft)—

(Rolls, f. o. b. mill)

Bleached Papers— M.F. & M.G. Waxing,	per cwt.
20 lb. (Carloads only)	7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.50 to 5.75

Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	6.00 to 6.50
Envp. Mla., Sub. 16-23 (No. 2)	5.75 to 6.00
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M.G. Sulphite and Kraft (other than Waxing)	
Grade A-22 lb.	7.20 to 7.40
Grade B-22 lb.	6.75 to 7.00

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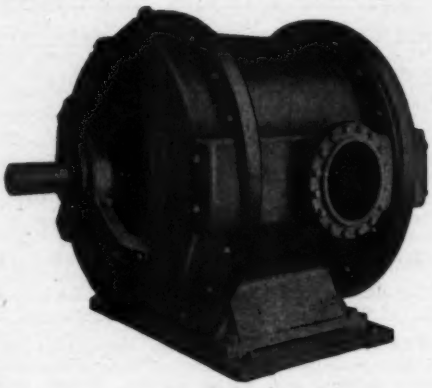

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SOUTH NORWALK, CONNECTICUT, U. S. A.

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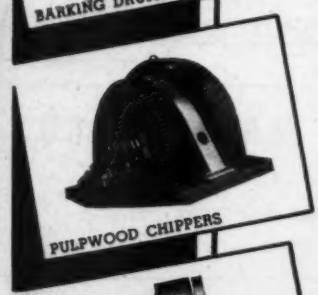
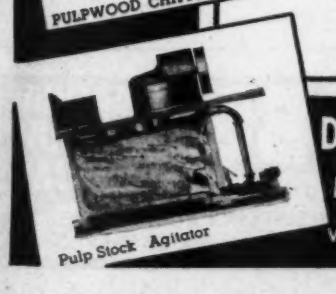
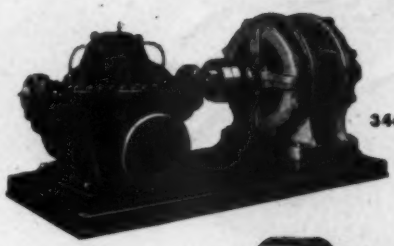


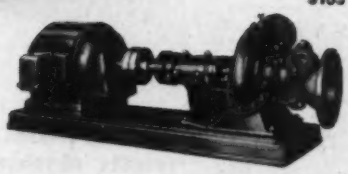


SHOWN here are only three of machines in our line, designed to keep step with modern paper mill production. Two of the items have been serving the industry for years, being improved as operating conditions demanded more and more production. Also is shown one of the new Murray machines, the pulp stock agitator. If you are interested in paper mill or woodroom equipment to aid your production now or increase the efficiency for the postwar period, complete details will be furnished upon request.

MURCO
D. J. MURRAY MANUFACTURING CO.
WAUSAU, WISCONSIN

From clear water to 6% stock



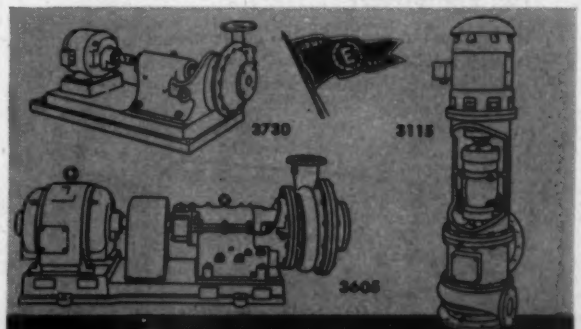


It may be a shower pump for handling clear water, or a beater pump handling 6% stock. When it's a Goulds Pump you can be sure it's a pump that was selected from Goulds' complete line to do that particular job most efficiently and economically.

And for every other process in pulp and paper making where pumps are required for specific duties you will find that in Goulds' complete line there is the pump of the type, capacity and material of construction to give you trouble-free long lasting service.

Goulds' ninety-six years of pump building exclusively includes many years intensive study of the pumping needs of the pulp and paper making industry. The results of this application are shown in the predominance of Goulds Pumps in pulp and paper making plants throughout the country. Whatever direction your operations may lead in postwar days you can be sure that Goulds will go along with you and provide from its line of centrifugal, rotary and reciprocating pumps *the* Pump for *the* job.

GOULDS PUMPS, INC., SENECA FALLS, N.Y.



Goulds
the PUMP FOR the JOB

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★ There are too many operators who are sour on Oil Purification . . . completely disappointed with the results they are getting with cheap and inadequate oil filters and strainers.

Honan-Crane "Continuous" Oil Purifiers are constantly replacing this inefficient equipment, but such costly experimentation is the long, hard way to get good results.

We believe that if any operator or prospective purchaser will first expose himself to the value of Honan-Crane Equipment in the terms of *results attained,* he will *buy* Honan-Crane and get the kind of Oil Purification every operator wants . . . THE CONTINUOUS REMOVAL OF ALL ABRASIVES, ACIDS, SLUDGES and DANGEROUS CONTAMINATION AS FAST AS IT IS LIBERATED BY THE OPERATING EQUIPMENT.

The cost of such effective purification is very small in relation to the savings accomplished in reduced wear and lowered maintenance costs.

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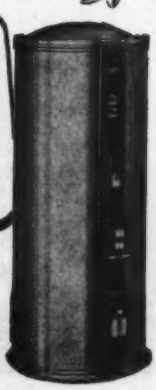

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Subsidiary of Houdaille-Hershey Corp.

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Applicants must conform with War Manpower Regulations.

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WANTED—Machine tender for cylinder machine operations. Must be experienced at this particular kind of machine operations. Prefer high school graduate or equivalent. Address Box 382, Fritz Publications, Inc.

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Machinery for Ground Wood and Chemical Pulp Mills.

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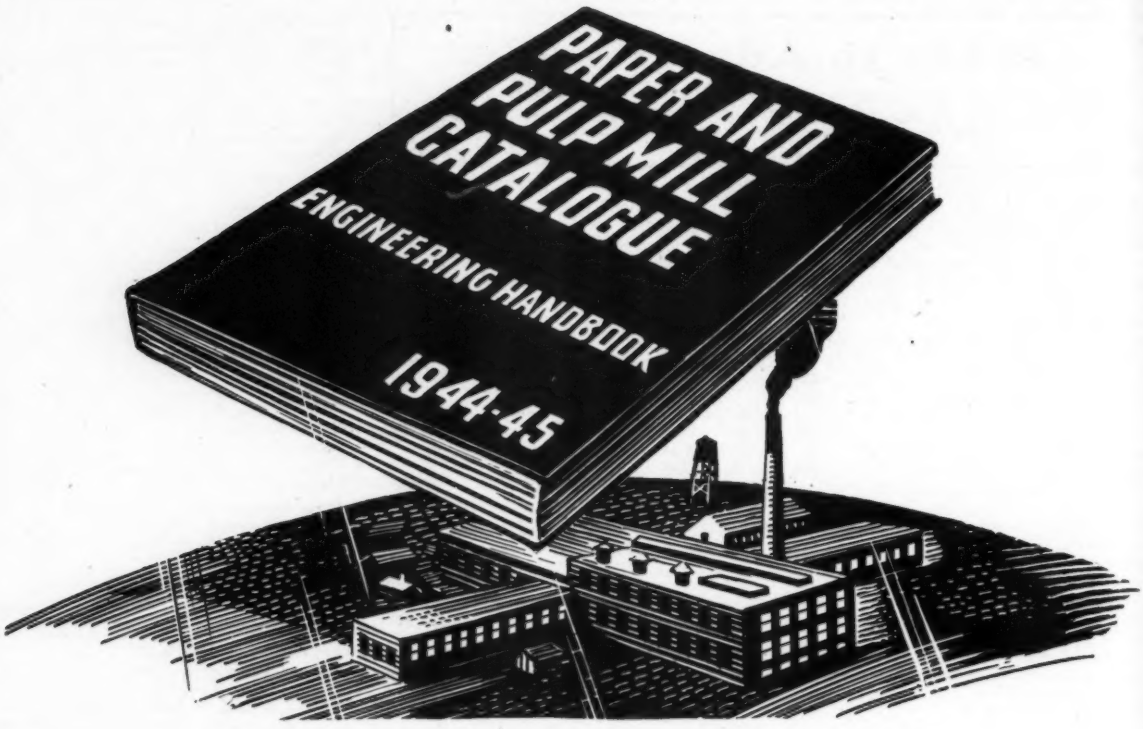

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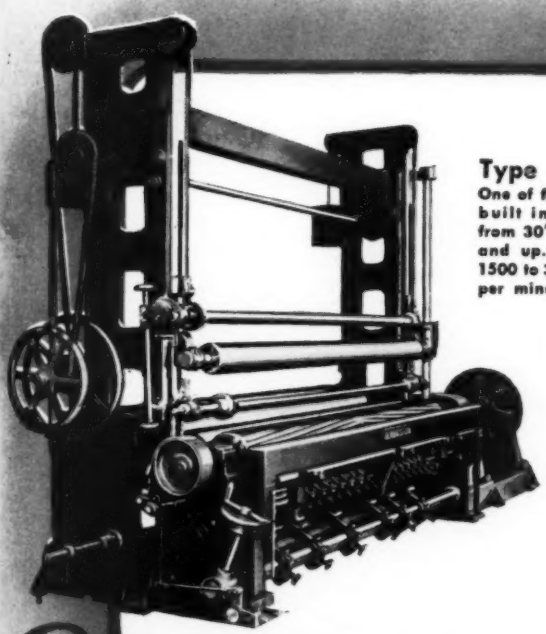

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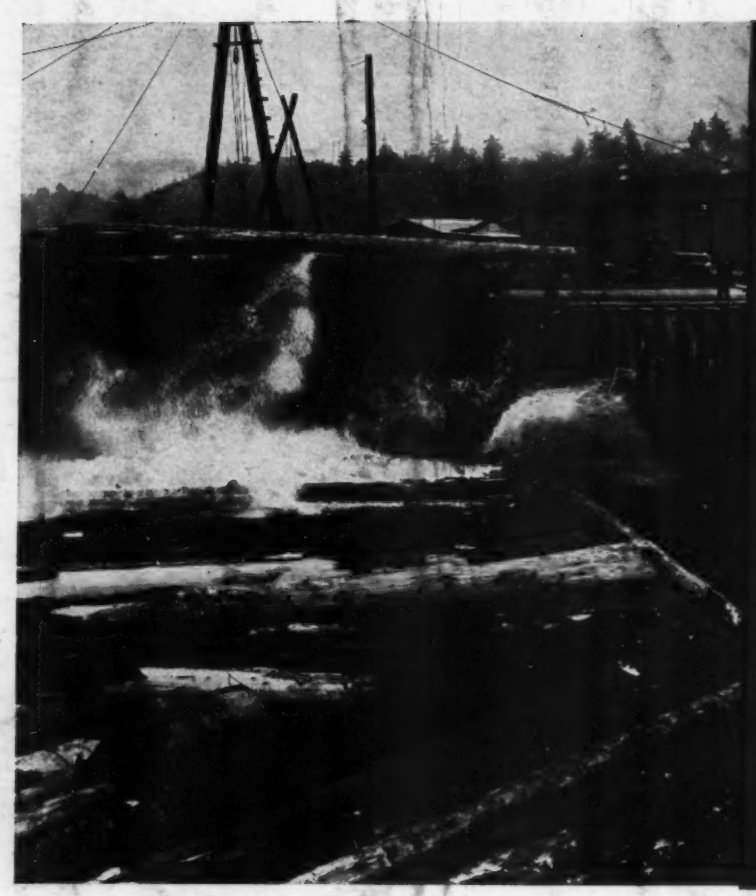

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